CE103 Algorithms and Programming I

Introduction to Code Reusability and Automate Testing

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0.1 CE103 Algorithms and Programming I

0.1.1 Week-4

0.1.1.1 Introduction to Code Reusability and Automated Testing Download DOC^1 , $SLIDE^2$, $PPTX^3$

0.1.1.2 Outline

- Introduction to Code Reusability and Automated Testing
- Shared Library Development
 - C
 - C++
 - C#
 - Java
- Unit Testing
 - C
 - C++
 - C#
 - Java
- Continues Integration Platforms

0.2 Introduction to Code Reusability and Automated Testing

• During this course, we will use entry-level shared library development and their tests and test automation. Also, we will see TDD(Test Driven Development) approach.

0.3 Selected Development Environment

• During this course, we will use Windows OS, Eclipse and Visual Studio Community Edition environments for examples.

0.4 Example Content

- Each example will include two function
- "Hello <name>" printing function with name sayHelloTo(name) and sum of two variable function for basic, sum = sum(a,b). This sum function will add a to b and return the result to the sum variable.
- We will locate them in the library and use them from a console application, also we will create unit tests for testing their functionalities and return variables

¹ce103-week-4-test.en.md_doc.pdf

 $^{^{2}}$ ce103-week-4-test.en.md_slide.pdf

 $^{^{3}}$ ce103-week-4-test.en.md_slide.pptx

0.5 Shared Library Development

- 0.5.1 C Programming (Static Library)
- 0.5.1.1 Visual Studio Community Edition

0.6 Shared Library Development - (VS C Static Library)-1

- In this sample, we will create a **c-lib-sample** project that contains a library, executable, unit tests and unit test runners.
- First of all, you install Visual Studio Community Edition from the website
 - Visual Studio 2019 Community Edition Son Ücretsiz Sürümü İndir⁴

0.7 Shared Library Development - (VS C Static Library)-2

• Open visual studio community edition and select create a new project



 $^{^{\}rm 4} \rm https://visualstudio.microsoft.com/tr/vs/community/$

0.8 Shared Library Development - (VS C Static Library)-3

• Select create a new project

| Get started | | | | | | |
|--------------|-------------------------------------------------------------------------------------------|--|--|--|--|--|
| ↓ | Clone a repository Get code from an online repository like GitHub or Azure DevOps | | | | | |
| Ċ | Open a project or solution Open a local Visual Studio project or .sln file | | | | | |
| | Open a local folder Navigate and edit code within any folder | | | | | |
| * ` ` | Create a new project Choose a project template with code scaffolding to get started | | | | | |
| | Continue without code → | | | | | |

0.9 Shared Library Development - (VS C Static Library)-4

• Select C++ static library from the project list

| Search f | or templates (Alt+S) | | - م | | Clear all | |
|-------------|-------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------|------------------------------|------------|---|
| C++ | • | Windows | | All project types | | |
| ¢ | Epic Games Launcher (Un Unreal Engine 4 is a comp C++ Windows | real Engine install cli plete suite of game do Games | ent) evelopment too | ols. | | |
| ∎ 43∎ | Dynamic-Link Library (DL Build a .dll that can be sha C++ Windows | L) ared between multip Library | le running Wind | dows apps. | | |
| . | Static Library Build a .lib that can be pa C++ Windows | ckaged inside other \ Library | Windows execu | tables. | | |
| * ** | Shared Items Project A Shared Items project is C++ Windows | used for sharing files Android iOS | between multi Linux Desk | ple projects. top Console | Library UW | P |
| | | | | | | |

0.10 Shared Library Development - (VS C Static Library)-5

• Give static library project name

| Configure your new project | |
|-----------------------------------------------------------------------------------------------|--|
| tatic Library C++ Windows Library | |
| roject name | |
| c-sample-lib | |
| ocation | |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming I\Lectures\ce1(👻 | |
| olution name (i) | |
| c-sample-lib | |
| Place solution and project in the same directory | |
| | |
| | |
| | |

0.11 Shared Library Development - (VS C Static Library)-6

• Default configuration come with C++ project types and setting



0.12 Shared Library Development - (VS C Static Library)-7

In the c-sample-lib.cpp you will sample function

```
void fncsamplelib(){
```

}

0.13 Shared Library Development - (VS C Static Library)-8

Delete pch.h and pch.c files. Also disable use precompiled header settings from configurations and change to "Not Using Precomplied Headers", also you can delete precomplied Header File.



0.14 Shared Library Development - (VS C Static Library)-9

- Customize library header name and update framework.h to samplelib.h
- Insert your functions inside the c-sample-lib.c and update header files also.

```
// c-sample-lib.cpp : Defines the functions for the static library.
11
#include "samplelib.h"
#include "stdio.h"
/// <summary>
111
/// </summary>
/// <param name="name"></param>
void sayHelloTo(char* name){
    if (name != NULL){
        printf("Hello %s \n",name);
    }
    else {
        printf("Hello There\n");
    }
}
/// <summary>
///
```

```
/// </summary>
/// <param name="a"></param>
/// <param name="b"></param>
/// <returns></returns>
int sum(int a, int b){
    int c = 0;
    c = a + b;
    return c;
}
```

0.15 Shared Library Development - (VS C Static Library)-10

• Also, update samplelib.h as follows.

#pragma once

```
#define WIN32_LEAN_AND_MEAN
void sayHelloTo(char* name);
int sum(int a, int b);
```

0.16 Shared Library Development - (VS C Static Library)-11

• If you check the configuration you will see that for C compiler we are using Microsoft Environment and Toolkits

// Exclude rarely-used stuff from Windows headers

| | ✓ Platform: | Active(Win32) V Configuration Manager | |
|---|---------------------------------|----------------------------------------------|--------|
| ~ | General Properties | | |
| | Output Directory | <pre>\$(SolutionDir)\$(Configuration)\</pre> | |
| | Intermediate Directory | \$(Configuration)\ | |
| | Target Name | \$(ProjectName) | |
| | Configuration Type | Static library (.lib) | |
| | Windows SDK Version | 10.0 (latest installed version) | |
| | Platform Toolset | Visual Studio 2019 (v142) | \sim |
| | C++ Language Standard | Default (ISO C++14 Standard) | |
| | C Language Standard | Default (Legacy MSVC) | |
| | | | |
| | | | |
| | | | |

0.17 Shared Library Development - (VS C Static Library)-12

• Now we can compile our library



0.18 Shared Library Development - (VS C Static Library)-13

• You can follow operation from the output window



- 0.19 Shared Library Development (VS C Static Library)-14
 - In the debug folder, we will see our output

ネ



0.20 Shared Library Development - (VS C Static Library)-15

• Now we will add a console application c-sample-app and use our library



0.21 Shared Library Development - (VS C Static Library)-16

select C++ Windows Console Application from list

| Search fo | or templates (Alt+S) | | <i>۹</i> - | |
|-----------|-----------------------------------------------------------------|--------------------------------------|-------------|---------------------------|
| C++ | - | Windows | | All project types |
| 2 | Empty Project Start from scratch with C++ C++ Windows Co | for Windows. Provides | no startin | g files. |
| C:V | Console App Run code in a Windows tern C++ Windows Co | ninal. Prints "Hello Wor Insole | ld" by defa | ault. |
| | CMake Project Build modern, cross-platfor C++ Windows Lin | m C++ apps that don't nux Console | depend or | n .sln or .vcxproj files. |
| <u> </u> | Windows Desktop Wizard | | | |

0.22 Shared Library Development - (VS C Static Library)-17

• C++ Console Application Selection will generate a C++ console project we can change extension to C to compile our application as C application.

we will convert c-sample-app.c to following code

#include <stdio.h>

```
/// <summary>
///
/// </summary>
/// <returns></returns>
int main()
{
    printf("Hello World!\n");
}
```

0.23 Shared Library Development - (VS C Static Library)-18

after conversion set c-sample-app as startup project and build it



• this will create c-sample-app.exe in the same folder with c-sample-lib.lib library



• if we run the application we will see only "Hello World"

0.24 Shared Library Development - (VS C Static Library)-19

• now we will see two options to add a library as references in our application and use its functions.

0.25 Shared Library Development - (VS C Static Library)-20

First option

• right click references for c-sample-app and add current library as reference



- 0.26 Shared Library Development (VS C Static Library)-21
- Search Solution Explorer (Ctrl+ş)
 Solution 'c-sample-lib' (2 of 2 projects)
 C-sample-app
 Reference:

 Add Reference:
 Add Reference:
 Manage Connected Services
 Manage NuGet Packages...
 Scope to This
 New Solution Explorer View
 Paste
- Select Add Reference

0.27 Shared Library Development - (VS C Static Library)-22

• Browse for solution and select c-sample-lib

Add Reference Image: Add Reference <

0.28 Shared Library Development - (VS C Static Library)-23

You can check added reference from references section



0.29 Shared Library Development - (VS C Static Library)-24

- Now we can include required headers from c-sample-lib folder and use it.
- We can include required header with relative path as follow or with configuration

```
#include <stdio.h>
#include "..\c-sample-lib\samplelib.h"
/// <summary>
///
/// </summary>
/// <returns></returns>
int main()
{
    printf("Hello World!\n");
}
```

0.30 Shared Library Development - (VS C Static Library)-25

• we can build our c-sample-app



0.31 Shared Library Development - (VS C Static Library)-26

• Also we can only write header name

```
#include <samplelib.h>
```

0.32 Shared Library Development - (VS C Static Library)-27

• For this option, we need to configure include directories

| Configuration: | Debug | | Platform: Active | (Win32) | ✓ Configuration Manager |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| ✓ Configuration General Advance Debugg VC++ D ▷ C/C++ ▲ Linker Gen Input Mar Deb Syst Opti Emb Win | ed jing birectories eral ut hifest File ugging em imization bedded IDL dows Metadata | ~ | GeneralExecutable DirectoriesInclude DirectoriesExternal Include DirectoriesReference DirectoriesLibrary DirectoriesLibrary WinRT DirectoriesSource DirectoriesExclude DirectoriesPublic Project ContentPublic Include DirectoriesAll Header Files are PublicPublic C++ Module DirectoriesAll Modules are Public | \$(VC_ExecutablePath_x86); \$(VC_IncludePath);\$(Windo <edit> \$(VC_LibraryPath_x86);\$(W \$(WindowsSDK_MetadataP \$(VC_SourcePath); \$(CommonExcludePath);\$(No No</edit> | \$(CommonExecutablePath) owsSDK_IncludePath); indowsSDK_LibraryPath_x86) ath); VC_ExecutablePath_x86);\$(VC_LibraryPath_x86); |
| Adv All C Con ▷ Manifes ▷ XML Do ▷ Browse ▷ Build Ev | anced Options mmand Line st Tool ocument Genera Information rents | Pa va | c lude Directories th to use when searching for include f riable INCLUDE. | files while building a VC++ proj OK | ect. Corresponds to environment Cancel Apply |

0.33 Shared Library Development - (VS C Static Library)-28

select c-sample-lib header file location



browse for folder

| K Select Directory | | | | × |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------|-------------|-----------------|
| \leftarrow \rightarrow \checkmark \uparrow \blacksquare « Week-4 \Rightarrow c-lib-sample \Rightarrow c-sample-lib \Rightarrow c-samp | le-lib → | ~ | ට 🔎 Sear | ch c-sample-lib |
| Organize 🔻 New folder | | | | :== - ? |
| Microsoft Visual S | Date modified | Туре | Size | |
| OneDrive - Persor | 10/23/2021 4:15 PM | File folder | | |
| 💻 This PC | | | | |
| 🧊 3D Objects | | | | |
| Desktop | | | | |
| Documents | | | | |
| 🖊 Downloads | | | | |
| 👌 Music | | | | |
| E Pictures | | | | |
| 📔 Videos | | | | |
| 🏪 Windows (C:) | | | | |
| ENOVO (D:) | | | | |
| DATA (E:) | | | | |
| ▲ | | | | |
| Folder: c-sample-lib | | | | |
| | | | Select Fole | der Cancel |

0.34 Shared Library Development - (VS C Static Library)-29

your full path will be added to your configuration

| Include Directories | ? | × |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|
| | * | ↓ ↑ |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming I\Lectures\ce103-algorithms-and-programming-I\Week-4\c-lib-sample\c-sa | mple-lib\c-sa | mple 🔺 |
| < Evaluated value: | | > |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming \Lectures\ce103-algorithms-and-programming- \Week-4\c-lib-sample\c-sa C\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\include C\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Auxiliary\VS\include C\Program Files (x86)\Mindows Kits\10\Include\10.0.19041.0\ucrt C\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\umr C\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\ump C\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\ump C\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\ump C\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\ump C\Program Files (| nple-lib\c-sar | nple ^ > |
| Inherited values: §(VC_IncludePath) §(WindowsSDK_IncludePath) | | ^ |
| Inherit from parent or project defaults | Mac K Ca | ros>> |

0.35 Shared Library Development - (VS C Static Library)-30

if you add header file paths to your configuration you can use header files by name in your source code

```
#include <stdio.h>
#include <samplelib.h>
/// <summary>
///
/// </summary>
/// <returns></returns>
int main()
{
    printf("Hello World!\n");
}
```

0.36 Shared Library Development - (VS C Static Library)-31

- we can compile the following we don't have problems but here we need to configure relative paths for configuration open include library settings and update with relative path
- ..\c-sample-lib

| Include Directories | ? | × |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------|
| | * | • |
| \c-sample-lib | | ^ |
| < | | > |
| Evaluated value: | | |
| \c-sample-lib \c-sample-lib\c-sample-lib C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\include C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\atlmfc\include C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\atlmfc\include C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\atlmfc\include C:\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\ucrt C:\Program Files (x86)\Windows Kits\10\Include\10.0.19041.0\uint C:\Program Files (x86)\Windows Kits\10.0.19041.0\uint C:\Program Files (x86)\Windows Kits\10.0.19041.0\uint | | > |
| \$(VC_IncludePath) \$(WindowsSDK_IncludePath) | | ~ |
| Inherit from parent or project defaults | м | lacros>> |
| C | Ж | Cancel |

0.37 Shared Library Development - (VS C Static Library)-32

• now we have portable source code configuration. we can call our functions and then we can update header and library folder configurations.

```
#include <stdio.h>
#include <samplelib.h>
/// <summary>
111
/// </summary>
/// <returns></returns>
int main()
{
    int result = 0;
    //printf("Hello World!\n");
    result = sum(5, 4);
    sayHelloTo("Computer");
    printf("Result is %d \n", result);
    printf("Press any key to continue...\n");
    getchar();
    return 0;
}
```

0.38 Shared Library Development - (VS C Static Library)-33

• when you run you will see the following outputs, which mean we called library functions.



0.39 Shared Library Development - (VS C Static Library)-34

• A static library is a code-sharing approach if you want to share your source code with your customers then you can share static libraries and header files. In another case you can use a precompiled static library with you or this library can be part of any installation then if there is an installed app and static libraries are placed on the system folder or any different location then you can use configuration files to set library path and included header paths

0.40 Shared Library Development - (VS C Static Library)-35

• Now we can remove the project from c-sample-app references but we will set library file in configuration

Before this copy static library and header files to a folder like that

DebugStaticLibDeployment

• Set C/C++ -> General -> Additional Include Directories

There is a bug in configurations and relative path not finding headers so for this reason we will set full path but this is not a good practice for team working

0.41 Shared Library Development - (VS C Static Library)-36

Not Working Solution

..\c-sample-lib\DebugStaticLibDeployment

| c-sample-app Property Pages | | ? × |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration: Debug | ✓ Platform: Active(Wire) | n32) ~ Configuration Manager |
| ✓ Configuration Properties General Advanced Debugging VC++ Directories ✓ C/C++ ✓ General Optimization Preprocessor Code Generation Language Precompiled Heade Output Files Browse Information External Includes Advanced All Options Command Line > Linker > Manifest Tool > XML Document Genera > Browse Information | Additional Include Directories Additional #using Directories Additional BMI Directories Additional BMI Directories Additional Module Dependencies Additional Header Unit Dependencies Scan Sources for Module Dependencies Translate Includes to Imports Debug Information Format Support Just My Code Debugging Common Language RunTime Support Consume Windows Runtime Extension Suppress Startup Banner Warning Level Treat Warnings As Errors Warning Version Diagnostics Format SDL checks Multi-processor Compilation Enable Address Sanitizer Additional Include Directories | \c-sample-lib\DebugStaticLibDeployment;%(Additiona No No No Program Database for Edit And Continue (/Zl) Yes (/JMC) Yes (/nologo) Level3 (/W3) No (/WX-) Column Info (/diagnostics:column) Yes (/sdl) No |
| < >> (| (/[path]) | OK Cancel Apply |

0.42 Shared Library Development - (VS C Static Library)-37

Working Solution

 $\verb"E:\...\c-lib-sample\c-sample-lib\DebugStaticLibDeployment"$

| c-sample-app Property Pages | | ? × |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------|
| Configuration: Debug | V Platform: Active(W | /in32) |
| ✓ Configuration Properties ∧ General Advanced | Additional Include Directories Additional #using Directories | E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 🗸 🔺 |
| Debugging VC++ Directories | Additional Module Dependencies Additional Header Unit Dependencies | |
| General Optimization | Scan Sources for Module Dependencie Translate Includes to Imports | No |
| Preprocessor Code Generation | Support Just My Code Debugging Common Language RunTime Support | Yes (/JMC) |
| Language Precompiled Heade Output Files | Consume Windows Runtime Extension Suppress Startup Banner | Yes (/nologo) |
| Browse Information External Includes | Warning Level Treat Warnings As Errors | Level3 (/W3) No (/WX-) |
| Advanced All Options Command Line | Diagnostics Format | Column Info (/diagnostics:column) |
| ▷ Linker ▷ Manifest Tool | Multi-processor Compilation Enable Address Sanitizer | No |
| ▷ XML Document Genera ▷ Browse Information | Additional Include Directories Specifies one or more directories to add to | the include path. Separate with ';' if more than one. |
| | (լիզույ) | OK Cancel Apply |

0.43 Shared Library Development - (VS C Static Library)-38

Now we will set library folder that our static library placed

we will set VC++ Directories -> Library Directories

Here is the same issue if we use relative path it doesn't work we need to set full path for library folder

0.44 Shared Library Development - (VS C Static Library)-39

Working Solution

 ${\tt E:\...\c-lib-sample\c-sample-lib\DebugStaticLibDeployment}$

c-sample-app Property Pages

| Configuration: Debug | | ✓ Platform: A | active(Win32) | ~ | Configuration Manager |
|------------------------------|-----|------------------------------------|------------------------------|-----------------|------------------------------|
| ▲ Configuration Properties ▲ | ~ | General | | | |
| General | | Executable Directories | \$(VC_Executable | Path_x86);\$(Co | mmonExecutablePath) |
| Advanced | | Include Directories | \$(IncludePath) | | |
| Debugging | | External Include Directories | \$(ExternalInclud | lePath) | |
| VC++ Directories | | Reference Directories | \$(VC_References | Path_x86); | |
| ▲ C/C++ | | Library Directories | E:\UgurCoruh\R | TEU\Lectures\ | 2021-2022 Güz CE103 - A 🗸 |
| General | | Library WinRT Directories | \$(WindowsSDK_M | MetadataPath); | |
| Optimization | | Source Directories | \$(VC_SourcePath |); | |
| Preprocessor | | Exclude Directories | \$(CommonExclu | dePath);\$(VC_E | xecutablePath_x86);\$(VC_Lib |
| Code Generation | ~ | Public Project Content | | | |
| Drecompiled Heads | | Public Include Directories | | | |
| Output Files | | All Header Files are Public | No | | |
| Browse Information | | Public C++ Module Directories | | | |
| External Includes | | All Modules are Public | No | | |
| Advanced | | | | | |
| All Options | | | | | |
| Command Line | | | | | |
| Linker | | | | | |
| Manifest Tool | | | | | |
| XML Document Genera | Lik | orary Directories | | | |
| Browse Information | Pa | th to use when searching for libra | ary files while building a V | C++ project. C | orresponds to environment |
| < > | va | riable LIB. | | | |
| | | | C | ОК | Cancel Apply |

? X

0.45 Shared Library Development - (VS C Static Library)-40

| Library Directories | ? | × |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|
| | * | ↓ ↑ |
| E\\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming I\Lectures\ce103-algorithms-and-programming-I\Week-4\c-lib-sample and Programming I\Lectures\ce103-algorithms-and-programming-I\Week-4\c-lib-samp | ole\c-sample-lib\De | bugSta 🔨 |
| < | | > |
| Evaluated value: | | |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming \Lectures\ce103-algorithms-and-programming- \Week-4\c-lib-samp C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\lib\x86 C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\atlmfc\lib\x86 C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Auxiliary\VS\lib\x86 C:\Program Files (x86)\Mindows Kits\10\lib\10.0.19041.0\urn\x86 C:\Program Files (x86)\Windows Kits\10\lib\10.0.19041.0\urn\x86 C:\Program Files (x86)\Windows Kits\NETFXSDK\4.8\lib\urn\x86 | le∖c-sample-lib∖Del | ougSta 🔨 |
| < | | > |
| Inherited values: | | |
| \$(VC_LibraryPath_x86) \$(WindowsSDK_LibraryPath_x86) | | ~ |
| Inherit from parent or project defaults | м | acros>> |
| | ОК | Cancel |

0.46 Shared Library Development - (VS C Static Library)-41

Not Working

..\c-sample-lib\DebugStaticLibDeployment

| c-sample-app Property Pages | | ? × |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration: Debug | ✓ Platform: | Active(Win32) V Configuration Manager |
| Configuration Properties General Advanced Debugging VC++ Directories C/C++ Linker Manifest Tool XML Document Generator Browse Information Build Events Custom Build Step Code Analysis | General Executable Directories Include Directories External Include Directories External Include Directories Library Directories Library WinRT Directories Source Directories Exclude Directories Public Project Content Public Include Directories All Header Files are Public Public C++ Module Directories All Modules are Public | \$(VC_ExecutablePath_x86);\$(CommonExecutablePath) \$(IncludePath) \$(ExternalIncludePath) \$(VC_ReferencesPath_x86); \c-sample-lib\DebugStaticLibDeployment;\$(LibraryPath) \$(WindowsSDK_MetadataPath); \$(VC_SourcePath); \$(CommonExcludePath);\$(VC_ExecutablePath_x86);\$(VC_Libr No tries No |
| < > | Executable Directories Path to use when searching for environment variable PATH. | executable files while building a VC++ project. Corresponds to |
| | | OK Cancel Apply |

0.47 Shared Library Development - (VS C Static Library)-42

| Library Directories | | ? | × |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|------|
| | * | × ↓ | Ŷ |
| [<mark>\c-sample-lib\DebugStaticLibDeployment</mark> | |] |] ^ |
| < | | > | ~ |
| Evaluated value: | | | |
| \c-sample-lib\DebugStaticLibDeployment C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\lib\x86 C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Tools\MSVC\14.29.30133\atlmfc\lib\x86 C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\Auxiliary\VS\lib\x86 C:\Program Files (x86)\Windows Kits\10\lib\10.0.19041.0\um\x86 C:\Program Files (x86)\Windows Kits\NUETFXSDK\4.8\lib\um\x86 | | | ^ |
| | | | ~ |
| Inherited values: | | | - |
| \$(VC_LibraryPath_x86) \$(WindowsSDK_LibraryPath_x86) | | | ^ |
| | | | ~ |
| Inherit from parent or project defaults | | Macros | >> |
| | ОК | Cance | el 🛛 |
| Error List | | | |
| Entire Solution - Solu | Messag | es | |
| ^{''i} Code Description | | | |
| 😣 LNK1104 cannot open file 'c-sample-lib.lib' | | | |

0.48 Shared Library Development - (VS C Static Library)-43

If we set full path for both libraries and headers then we need to set library name for project Linker->Input->Additional Dependencies

| Configuration: Debug Platform: Active(Win32) Configuration Manager Preprocessor Code Generation Language Ignore All Default Libraries Ignore Specific Default Libraries Precompiled Heade Output Files Module Definition File Module Definition File Browse Information External Includes Add Module to Assembly Embed Managed Resource File All Options Command Line Seneral Delay Loaded Dils Manifest File Debugging System Delay Loaded Dils Advanced All Options Advanced All Options Command Line Vindows Metadata Advanced All Options All Options Command Line Vindows Metadata Advanced All Options Specifies additional items to add to the link command line. [i.e. kernel32.lib] | c-sample-app Property Pages | | | ? × |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------|
| Preprocessor Additional Dependencies c-sample-lib.lib;%(AdditionalDependencies) Language Precompiled Heade Ignore All Default Libraries Output Files Ignore All Default Libraries Ignore Specific Default Libraries Browse Information External Includes Addwanced Adloptions Command Line Embed Managed Resource File Linker General Delay Loaded Dlls Advanced All Options Assembly Link Resource Optimization Embed Managed Resource Sile Assembly Link Resource Windows Metadata Advanced All Options Command Line All Options Vindows Metadata Advanced Additional Dependencies Specifies additional items to add to the link command line. [i.e. kernel32.lib] OK Cancel | Configuration: Debug | → Platform: | Active(Win32) ~ | Configuration Manager |
| < >> OK Cancel Apply | Preprocessor Code Generation Language Precompiled Heade Output Files Browse Information External Includes Advanced All Options Command Line Linker General Input Manifest File Debugging System Optimization Embedded IDL Windows Metadata Advanced All Options Command Line | Additional Dependencies Ignore All Default Libraries Ignore Specific Default Librar Module Definition File Add Module to Assembly Embed Managed Resource F Force Symbol References Delay Loaded DIIs Assembly Link Resource | c-sample-lib.lib;%(Additional ries | Dependencies) |
| | < > | | ОК | Cancel Apply |

In this case we will compile c-sample-app and we do not need to compile c-sample-lib because we copied output files to a different location and they are ready to use.

0.49 Shared Library Development - (VS C Static Library)-44

current source code will be like that nothing changed

```
#include <stdio.h>
#include <samplelib.h>
/// <summary>
///
/// </summary>
/// <returns></returns>
int main()
{
    int result = 0;
    //printf("Hello World!\n");
    result = sum(5, 4);
    sayHelloTo("Computer");
    printf("Result is %d \n",result);
    printf("Press any key to continue...\n");
    getchar();
    return 0;
}
```

0.50 Shared Library Development - (VS C Static Library)-45

• and output will be as follow

E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Progra



0.51 Shared Library Development - (VS C Static Library)-46

There is a option about portability that we can set for team works

We will remove all library related settings from configurations and we will write them in source code Clear linker->general->additional library directories

| Configuration: | Debug | ✓ Platform: Ac | tive(Win32) V | Configuration Manager |
|----------------|------------------|---------------------------------------|------------------------------------------|-----------------------|
| ▲ Configurati | ion Properties 🔺 | Output File | \$(OutDir)\$(TargetName)\$(Targe | tExt) |
| General | | Show Progress | Not Set | |
| Advanc | ed | Version | | |
| Debugg | jing | Enable Incremental Linking | Yes (/INCREMENTAL) | |
| VC++ D | irectories | Incremental Link Database File | \$(IntDir)\$(TargetName).ilk | |
| ▷ C/C++ | | Suppress Startup Banner | Yes (/NOLOGO) | |
| ▲ Linker | | Ignore Import Library | No | |
| Gen | eral | Register Output | No | |
| Inpu | IT | Per-user Redirection | No | |
| Ivian Dob | ugging | Additional Library Directories | %(AdditionalLibraryDirectorie | s) |
| Svet | em | Link Library Dependencies | Yes | B. |
| Onti | imization | Use Library Dependency Inputs | No | |
| Emb | edded IDL | Link Status | | |
| Win | dows Metadata | Prevent DII Binding | | |
| Adv | anced | Treat Linker Warning As Errors | | |
| All C | Options | Force File Output | | |
| Con | nmand Line | Create Hot Patchable Image | | |
| Manifes | it Tool | Specify Section Attributes | | |
| XML Do | cument Genera | | | |
| Browse | Information | Additional Library Directories | | |
| Build Ev | rents 🗸 🗸 | Allows the user to override the envir | onmental library path. (/LIBPATH:folder) | |
| < | > | | | |

0.52 Shared Library Development - (VS C Static Library)-47

Clear C/C++ -> General -> Additional Include Directories

| c-sample-app Pr | roperty Pages | | | | | | ? | × |
|---------------------------------|----------------|------|---------------------------------|-------------|------------------------------------|------------------|----------|---|
| Configuration: | Debug | | Platform: | Active(Wi | n32) ~ | Configuration I | Manager. | |
| Configurati | ion Properties | • | Additional Include Directorie | 5 | %(AdditionalIncludeDirectorie | s) | \sim | ^ |
| General | L | | Additional #using Directories | 5 | | | | |
| Advanc | ed. | | Additional BMI Directories | | | | | |
| Debugg | ging | | Additional Module Depende | ncies | | | | |
| VC++ D | Directories | | Additional Header Unit Depe | ndencies | | | | |
| ▲ C/C++ | | | Scan Sources for Module De | pendencies | No | | | |
| Gen | eral | | Translate Includes to Imports | | No | | | |
| Opti | imization | | Debug Information Format | | Program Database for Edit And | Continue (/Zl) | | |
| Prep | processor | | Support Just My Code Debug | gging | Yes (/JMC) | | | |
| Cod | le Generation | | Common Language RunTim | e Support | | | | |
| Lang | guage | | Consume Windows Runtime | Extension | | | | |
| Out | complied Heade | | Suppress Startup Banner | | Yes (/nologo) | | | |
| Brou | weelnformation | | Warning Level | | Level3 (/W3) | | | |
| Exte | ernal Includes | | Treat Warnings As Errors | | No (/WX-) | | | |
| Adv | anced | | Warning Version | | | | | |
| All C | Options | | Diagnostics Format | | Column Info (/diagnostics:colu | mn) | | |
| Con | nmand Line | | SDL checks | | Yes (/sdl) | | | |
| Linker | | | Multi-processor Compilation | n | | | | |
| Manifes | st Tool | | Enable Address Sanitizer | | No | | | Υ |
| ▷ XML Do | ocument Genera | Ad | ditional Include Directories | | | | | |
| Browse | Information | / Sp | ecifies one or more directories | to add to t | he include path. Separate with ';' | if more than one | | |
| < | > | 0 | [path]) | | | | | |
| | | | | | ОК | Cancel | Apply | |

0.53 Shared Library Development - (VS C Static Library)-48

Clear Linker->Input->Additional Dependencies



0.54 Shared Library Development - (VS C Static Library)-49

Now we can set this configurations in source code as follow

```
#pragma comment(lib, "..\\DebugStaticLibDeployment\\c-sample-lib.lib")
#include "..\DebugStaticLibDeployment\samplelib.h"
```

```
#include <stdio.h>
```

```
/// <summary>
///
/// </summary>
/// <returns></returns>
int main()
{
    int result = 0;
    //printf("Hello World!\n");
    result = sum(5, 4);
    sayHelloTo("Computer");
    printf("Result is %d \n",result);
    printf("Press any key to continue...\n");
    getchar();
    return 0;
}
```

with this configuration if your friends download this code then they can run them with their environment without setting a path.

0.55 Shared Library Development

0.55.1 C++ Programming (Static Library)

0.55.1.1 Visual Studio Community Edition

0.56 Shared Library Development - (VS Cpp Static Library)-1

- All steps are similar with C programming above, but you do not need to delete pch.h
- You should take care about compiled source codes
- for example if your code is compiled for x86 then your application also should use the x86 configuration else x64 then library should be x64 complied version.

0.57 Shared Library Development - (VS Cpp Static Library)-2

• Source will look like the following

```
// cpp-sample-app.cpp : This file contains the 'main' function. Program execution begins and ends there
//
```

#pragma comment(lib, "..\\DebugStaticLibDeployment\\cpp-sample-lib.lib")

```
#include "...\DebugStaticLibDeployment\samplelib.h"
```

```
#include <iostream>
```

```
int main()
{
    std::cout << "Hello World!\n";
    int result = 0;
    //printf("Hello World!\n");
    result = sum(5, 4);
    sayHelloTo("Computer");
    printf("Result is %d \n", result);
    printf("Press any key to continue...\n");
    getchar();
    return 0;</pre>
```

}

0.58 Shared Library Development

0.58.1 C++ Programming (Static Library)

0.58.1.1 Visual Studio Community Edition WSL Option

0.59 Shared Library Development - (VS Cpp WSL Static Library)-1

• Install WSL2

- GitHub - ucoruh/ns3-wsl-win10-setup: ns3 windows 10 WSL2 setup and usage⁵

⁵https://github.com/ucoruh/ns3-wsl-win10-setup

| | C++ | • | Linux | • | All project types |
|--------------------------|-----------------|------------------------------------------------------------------|-----------------------------------|-------------------------|---------------------------|
| | C B | Make Project uild modern, cross-platf C++ Windows | form C++ apps th Linux Console | at don't depend or e | n .sln or .vcxproj files. |
| | | Console Application Cun code in a Linux term C++ Linux Con | inal. Prints "hello' sole | ' by default. | |
| • Create a Linux project | _ [* † E | mpty Project | | | |

.

0.60 Shared Library Development - (VS Cpp WSL Static Library)-2

• Configure Platform Toolset to WSL
| | - | \$ | Solution Explorer | ▼ ╄ X | | | |
|-----------------|-------------|--------------------------------|--------------------------------------|---------------|--|--|--|
| | - | ÷ | © © ☆ ቭ ːo - 2 d @ < | o 🌶 💻 🖬 | | | |
| | | 1 | Search Solution Explorer (Ctrl+ş) | P - N | | | |
| | | Ш | Solution 'ConsoleApplication1' (1 o | of 1 project) | | | |
| | | Cle | an up C# | | | | |
| | <u>.*</u> . | Bu | ild | | | | |
| | | Re | build | | | | |
| | | De | ploy | | | | |
| | | Cle | an | | | | |
| | | Vie | w | • | | | |
| | | Pro | ject Only | + | | | |
| | •∡ | Ru | n Tests | | | | |
| | | Debug Tests | | | | | |
| | | Train IntelliCode Poirot Model | | | | | |
| | | Scope to This | | | | | |
| | | New Solution Explorer View | | | | | |
| | | Build Dependencies | | | | | |
| | ŧ | Add | | | | | |
| | | Class Wizard Ctrl+Shift+X | | | | | |
| | | Manage NuGet Packages | | | | | |
| | ø | Set | as Startup Project | | | | |
| | | De | bug | + | | | |
| Ln: 7 Ch: 2 SPC | Ж | Cu | t | Ctrl+X | | | |
| | â | Pa | te | Ctrl+V | | | |
| | × | Re | move | Del | | | |
| | χ | Re | name | F2 | | | |
| | | Un | load Project | | | | |
| | | Lo | ad Direct Dependencies of Project | | | | |
| | | Lo | ad Entire Dependency Tree of Project | | | | |
| | | Re: | can solution | | | | |
| | | Cle | ar Browsing Database Errors | | | | |
| | 0 | 0 | en Folder in File Evolorer | | | | |
| | 2 | Op | en in Terminal | | | | |
| | ۶ | Pro | perties | Alt+Enter | | | |
| | _ | | | | | | |

0.61 Shared Library Development - (VS Cpp WSL Static Library)-3

• Select GCC for Windows Subsystem for Linux

ConsoleApplication1 Property Pages

| Configuration: Debug | | Platform: Active(| x86) ~ Configuration Manager | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| ✓ Configuration Properties General Debugging VC++ Directories ▷ C/C++ ▷ Linker ▷ Build Events ▷ Custom Build Step | | General Output Directory Intermediate Directory Target Name Target Extension Extensions to Delete on Clean Build Log File Platform Toolset WSL *.exe full path Remote Copy Include Directories Remote Copy Exclude Directories | \$(ProjectDir)bin\\$(Platform)\\$(Configuration)\ \$(ProjectDir)obj\\$(Platform)\\$(Configuration)\ \$(ProjectName) .out *.d;*.tlog;\$(ExtensionsToDeleteOnClean) \$(IntDir)\$(MSBuildProjectName).log GCC for Windows Subsystem for Linux GCC for Windows Subsystem for Linux GCC for Remote Linux GCC for Remote Linux | | | |
| | Remote Copy Exclude Directories Intellisense Uses Compiler Defaults Enable Incremental Build Project Defaults Configuration Type Use of STL Platform Toolset Specifies the toolset used for building | Intellisense Uses Compiler Defaults Enable Incremental Build Project Defaults Configuration Type Use of STL | Clang for Windows Subsystem for Linux Clang for Remote Linux <inherit defaults="" from="" or="" parent="" project=""> Application (.out) Shared GNU Standard C++ Library</inherit> | | | |
| | | | OK Cancel Apply | | | |

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0.62 Shared Library Development - (VS Cpp WSL Static Library)-4

Put a breakpoint and run debugger



0.63 Shared Library Development - (VS Cpp WSL Static Library)-5

In the debugger for WSL you can use local WSL installation but if you want to run it on Release setting it require a SSH connection.

| Pı | oject | Build | Debug | Test | Analyze | Tools | Extensions | Window | Help | Search | | P | ConsoleApplication1 |
|----|---------|-----------|-----------|----------|------------|--------|----------------|--------------|------------|-----------------------|--------------------|---------|----------------------|
| 2 | - C1 | + Rel | ease 🔻 | x64 | | • 🕨 No | ne. A connecti | ion can be a | dded in To | ols Options Cross | s Platform Conne | ction M | anager 🕶 🔌 🗮 🚳 🖕 |
| | Getting | y Started | | main.cpp | ₽ X | | | | | | | | |
| 1 | 🔁 Con | soleApp | lication1 | | | | | | - (| Global Scope) | | | |
| 1 | | 1 | : | #incl | ude 🗸 | cstdi | 0> | | | | | | |
| | | 2 | | | | | | | | | | | |

0.64 Shared Library Development - (VS Cpp WSL Static Library)-6

• Configure SSH parameters

Connect to Linux

This project uses remote builds, and a remote machine is required to host the builds and debug. Please enter the remote machine details below.

Manage existing connections

| Host name: | 127.0.0.1 |
|----------------------|----------------|
| Port: | 22 |
| User name: | username |
| Authentication type: | Password • |
| Password: | |
| | Connect Cancel |

0.65 Shared Library Development - (VS Cpp WSL Static Library)-7

- so you have to complete the following steps.
- C/C++ Remote Linux Option over SSH
 - Enable SSH
 - * SSH on Windows Subsystem for Linux (WSL) | Illuminia Studios⁶
 - Connect to Remote WSL Environment
 - * Bağlan hedef Linux sisteminize Visual Studio | Microsoft Docs⁷

0.66 Shared Library Development

0.66.1 C# Programming (Dinamik Library)

0.66.1.1 Visual Studio Community Edition

 $^{^{6}} https://www.illuminiastudios.com/dev-diaries/ssh-on-windows-subsystem-for-linux/$

 $^{^{7}} https://docs.microsoft.com/tr-tr/cpp/linux/connect-to-your-remote-linux-computer?view=msvc-160$

0.67 Shared Library Development - (VS Csharp Dynamic Library)-1

- In C# project we will create class library we have several options
- for this sample we will select .NET core that we can build cross platform library

| class | × - Cle |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C# | Windows All project types |
| | Class library A project for creating a class library that targets .NET Standard or .NET Core C# Android Linux macOS Windows Library |
| , , | WPF <mark>Class</mark> library A project for creating a <mark>class</mark> library that targets a .NET Core WPF Application <i>C#</i> Windows Desktop Library |
| , 5 1€3]= | <mark>Class</mark> Library (Universal Windows) A project for creating a managed <mark>class</mark> library (.dll) for Universal Windows Platform (UW C# Windows Library UWP |
| , 1 58 (1)∎ | <mark>Class</mark> Library (.NET Framework) A project for creating a C# <mark>class</mark> library (.dll) C# Windows Library |
| | Razor <mark>Class</mark> Library A project template for creating a Razor <mark>class</mark> library. C# Linux macOS Windows Library Web |
| C# | Windows Forms Class Library A project template for creating a class library that targets .NET Windows Forms (WinForr |
| ଙ୍କ | WCF Service Library A project for creating a host-independent WCF service class library (.dll) C# Windows Library Web Service |

0.68 Shared Library Development - (VS Csharp Dynamic Library)-2

• There is no static library option

| Configure your new project |
|---------------------------------------------------------------------------------------------|
| Class library C# Android Linux macOS Windows Library |
| Project name |
| csharp-sample-lib |
| Location |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming I\Lectures\ce1(|
| Solution name (i) |
| csharp-sample-lib |
| Place solution and project in the same directory |
| |
| |

0.69 Shared Library Development - (VS Csharp Dynamic Library)-3

• We will select .Net Core 3.1

| Additional information | |
|------------------------------------------------------|---|
| Class library C# Android Linux macOS Windows Library | |
| Target Framework 🥡 | |
| .NET Core 3.1 (Long-term support) | - |
| .NET Standard 2.0 | |
| .NET Standard 2.1 | |
| .NET Core 2.1 (Long-term support) | |
| .NET Core 3.1 (Long-term support) | |
| | |

0.70 Shared Library Development - (VS Csharp Dynamic Library)-4

• You will have default empty class library file



- 0.71 Shared Library Development (VS Csharp Dynamic Library)-5
 - In the project you can see .NETcore reference



0.72 Shared Library Development - (VS Csharp Dynamic Library)-6

• We can build empty class library that generate dll for our application



0.73 Shared Library Development - (VS Csharp Dynamic Library)-7

• Now we will add Console Application but this will also use .NETCore

0.74 Shared Library Development - (VS Csharp Dynamic Library)-8

• Select New Project

| Search f | or templates (Alt+S) | | - م | | Clear all |
|------------|--------------------------------------------------------------------|------------------------------------|-----------------------------|----------------------|--------------------------|
| C# | • | Windows | • | All project types | |
| <u>C</u> # | Console Application A project for creating a c C# Linux macO | ommand-line applica S Windows C | ation that can r Console | un on .NET Core on W | findows, Linux and macOS |
| | | | | | |

- 0.75 Shared Library Development (VS Csharp Dynamic Library)-9
 - Set project name

| Configure your new project |
|------------------------------------------------------------------|
| Console Application C# Linux macOS Windows Console |
| Project name |
| csharp-sample-app |
| Location |
| C:\Users\ugur.coruh\Desktop\csharp-lib-sample\csharp-sample-lib\ |
| |
| |
| |

- 0.76 Shared Library Development (VS Csharp Dynamic Library)-10
 - Select .NETCore framework

| Additional information | |
|----------------------------------------------------|---|
| Console Application C# Linux macOS Windows Console | |
| Target Framework (i) | |
| .NET Core 3.1 (Long-term support) | • |
| .NET Core 2.1 (Long-term support) | |
| .NET Core 3.1 (Long-term support) | |
| .NET 5.0 (Current) | |
| | _ |

0.77 Shared Library Development - (VS Csharp Dynamic Library)-11

• You will have the following sample main.cs file

using System;

```
namespace csharp_sample_app
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Hello World!");
        }
    }
}
```

0.78 Shared Library Development - (VS Csharp Dynamic Library)-12

• Now we can link projects with adding references open reference section



0.79 Shared Library Development - (VS Csharp Dynamic Library)-13

• browse for class library project output folder and select output dll file for console application

| ample | -app | | | ? | × |
|-------|-----------------------|-------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| | | | Search (Ctrl+E) | | .م |
| | Name | Path | | | |
| ✓ | csharp-sample-lib.dll | C:\Users\ugur.coruh\ | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |
| | | Brow | se OK | Cano | :el |
| | ample | mple-app ✓ csharp-sample-lib.dll | Name Path ✓ csharp-sample-lib.dll C:\Users\ugur.coruh\ | Search (Ctrl+E) Name Path ✓ csharp-sample-lib.dll C:\Users\ugur.coruh\ | mple-app ? Search (Ctrl+E) ✓ csharp-sample-lib.dll C:\Users\ugur.coruh\ Browse OK Cance |

0.80 Shared Library Development - (VS Csharp Dynamic Library)-14

- now we can update our library code and use it in console application
- copy following sample to sampleLibClass file in the library

0.81 Shared Library Development - (VS Csharp Dynamic Library)-15 using System;

```
namespace csharp_sample_lib
{
    public class sampleLibClass
    {
        public static void sayHelloTo(string name)
        {
            if (!String.IsNullOrEmpty(name))
            {
                Console.WriteLine("Hello " + name);
            }
        else
            {
                Console.WriteLine("Hello There");
        }
    }
}
```

```
public static int sum(int a, int b)
{
     int c = 0;
     c = a + b;
     return c;
   }
}
```

0.82 Shared Library Development - (VS Csharp Dynamic Library)-16

• After this operation copy following sample to console application and build app then you can run

```
using csharp_sample_lib;
using System;
namespace csharp_sample_app
{
    class Program
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Hello World!");
            sampleLibClass.sayHelloTo("Computer");
            int result = sampleLibClass.sum(5, 4);
            Console.WriteLine("Results is" + result);
            Console.WriteLine("Results is {0}", result);
            Console.Read();
        }
    }
}
```

0.83 Shared Library Development - (VS Csharp Dynamic Library)-17

• You will see following output that mean we called DLL functions



0.84 Shared Library Development - (VS Csharp Dynamic Library)-18

- Also we can publish this console application with dll for linux environment or others
- for linux environment we should install .NETCore

0.85 Shared Library Development - (VS Csharp Dynamic Library)-19

- follow the link below or commands that I shared with you as below for deployment
- How to Install Dotnet Core on Ubuntu 20.04 TecAdmin⁸

Step 1 – Enable Microsoft PPA

```
wget https://packages.microsoft.com/config/ubuntu/20.04/packages-microsoft-prod.deb
sudo dpkg -i packages-microsoft-prod.deb
```

0.86 Shared Library Development - (VS Csharp Dynamic Library)-20

Step 2 – Installing Dotnet Core SDK

sudo apt update
sudo apt install apt-transport-https
sudo apt install dotnet-sdk-3.1

0.87 Shared Library Development - (VS Csharp Dynamic Library)-21

Step 3 – Install Dotnet Core Runtime Only

To install .NET Core Runtime on Ubuntu 20.04 LTS system, execute the commands:

sudo apt update

0.88 Shared Library Development - (VS Csharp Dynamic Library)-22

To install the previous version of .Net core runtime 2.1, type:

sudo apt install dotnet-runtime-2.1

Press "y" for any input prompted by the installer.

0.89 Shared Library Development - (VS Csharp Dynamic Library)-23

Step 4 – (Optional) Check .NET Core Version

You can use dotnet command line utility to check installed version of .NET Core on your system. To check dotnet version, type:

dotnet --version

⁸https://tecadmin.net/how-to-install-net-core-on-ubuntu-20-04/



0.90 Shared Library Development - (VS Csharp Dynamic Library)-24

- Now we will publish our application as single executable
- Open publish menu



0.91 Shared Library Development - (VS Csharp Dynamic Library)-25

• Select netcoreapp3.1 and Release for linux-x64

| csharp-sample-app: Publish | 😐 🗙 csharp-sample-lib.csproj | Program.cs | sampleLibClass.cs | |
|----------------------------|-----------------------------------|----------------------------|----------------------|--------------------|
| Connected Services | FolderProfile.pubxml • Folder | | | Q ç Publish |
| Publish | + New More actions - | | | |
| | (i) Ready to publish. | | | |
| | Settings | | | |
| | Target location | bin\Release\ne | tcoreapp3.1\publish\ | |
| | Configuration Target Framework | Release 💉 netcoreapp3.1 | 1 | |
| | Target Runtime | linux-x64 💉 | - | |
| | Show all settings | | | |
| | | | | |
| | | | | |
| | | | | |

0.92 Shared Library Development - (VS Csharp Dynamic Library)-26

• Select produce single file

Profile settings

| Profile name | FolderProfile | | |
|--------------------------------------|------------------------------------|------|--------|
| Configuration | Release Any CPU | | - |
| Target framework | netcoreapp3.1 | | • |
| Deployment mode | Framework-dependent | | - |
| Target runtime | linux-x64 | | - |
| Target location | bin\Release\netcoreapp3.1\publish\ | | |
| File publish opt | tions | | |
| ✓ Produce si | ngle file | | |
| | | | |
| | | | |
| | | | |
| | | Save | Cancel |
| laocuce (suar ca (uz | | | |

х

0.93 Shared Library Development - (VS Csharp Dynamic Library)-27

• After succesfull publish you will have linux binary that you can run with WSL

| eskto | :op > csharp-lib-sample > csharp-sample-lib > csharp-sample-app > bin > Release > netcoreapp3.1 > publish | | | | | | |
|-------|-----------------------------------------------------------------------------------------------------------|--------------------|-----------------|-------|--|--|--|
| nt | | | | | | | |
| | Name | Date modified | Туре | Size | | | |
| | csharp-sample-app | 10/24/2021 1:36 AM | File | 97 KB | | | |
| Ħ | 🗿 csharp-sample-app.pdb | 10/24/2021 1:36 AM | Program Debug D | 10 KB | | | |
| R | 🗿 csharp-sample-lib.pdb | 10/24/2021 1:30 AM | Program Debug D | 10 KB | | | |
| * | packages-microsoft-prod.deb | 4/23/2020 10:02 PM | DEB File | 4 KB | | | |
| * | | | | | | | |

0.94 Shared Library Development - (VS Csharp Dynamic Library)-28

- Open WSL and enter the path where this folder located
- And run application as follow



0.95 Shared Library Development - (VS Csharp Dynamic Library)-29

check dotnet -version and then run application





0.96 Shared Library Development - (VS Csharp Dynamic Library)-30

In this sample we created single application from settings lets try with shared library located option uncheck the "produce single file" option and publish again.

Then you will have the following outputs

| Name | Date modified | Туре | Size |
|----------------------------------------|--------------------|-------------------|-------|
| 📋 csharp-sample-app | 10/24/2021 1:36 AM | File | 88 KB |
| 🚺 csharp-sample-app.deps.json | 10/24/2021 1:36 AM | JSON File | 1 KB |
| 🚳 csharp-sample-app.dll | 10/24/2021 1:36 AM | Application exten | 4 KB |
| 🗿 csharp-sample-app.pdb | 10/24/2021 1:36 AM | Program Debug D | 10 KB |
| 🖸 csharp-sample-app.runtimeconfig.json | 10/24/2021 1:36 AM | JSON File | 1 KB |
| 🚳 csharp-sample-lib.dll | 10/24/2021 1:30 AM | Application exten | 4 KB |
| 🗿 csharp-sample-lib.pdb | 10/24/2021 1:30 AM | Program Debug D | 10 KB |

top > csharp-lib-sample > csharp-sample-lib > csharp-sample-app > bin > Release > netcoreapp3.1 > publish

0.97 Shared Library Development - (VS Csharp Dynamic Library)-31

- If you run csharp-sample-app
- you will have the same output



- 0.98 Shared Library Development
- 0.98.1 Java Programming
- 0.98.1.1 Eclipse IDE

0.99 Shared Library Development - (Eclipse Java Jar Library)-1

- You should download and install eclipse installer and then you should select Eclipse IDE for Java Developers
 - Eclipse Installer 2021-09 R | Eclipse Packages⁹

 $^{^{9} \}rm https://www.eclipse.org/downloads/packages/installer$







0.102 Shared Library Development - (Eclipse Java Jar Library)-4



- 0.103 Shared Library Development (Eclipse Java Jar Library)-5
 - select create a project



0.104 Shared Library Development - (Eclipse Java Jar Library)-6 select java project

New Project \times Select a wizard Create a Java project Wizards: type filter text 🗸 🗁 General ~ 😭 Project ✓ ▷→ Gradle Radle Project 🗸 冯 Java / Java Project # Java Project from Existing Ant Buildfile 🗸 🗁 Maven 📰 Check out Maven Projects from SCM 🎬 Maven Module 🆄 Maven Project 🗸 🗁 Examples v ? < Back Next > Finish Cancel

0.105 Shared Library Development - (Eclipse Java Jar Library)-7

• give project name

| New Java Project | | _ | | × |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------|---------------|--------|
| Create a Java Project Create a Java project in the workspace or in an external location. | | | | - |
| Project name: java-sample-lib | | | | |
| ☑ Use default location | | | | |
| Location: C:\Users\ugur.coruh\eclipse-workspace\java-sample-lib | | | Browse | |
| JRE | | | | |
| Use an execution environment JRE: | JavaSE-16 | | | \sim |
| O Use a project specific JRE: | jdk-16.0.1 | | | \sim |
| ○ Use default JRE 'jdk-16.0.1' and workspace compiler preferences | | <u>(</u> | Configure JR | Es |
| Project layout Use project folder as root for sources and class files Create separate folders for sources and class files | | Cor | nfigure defau | ılt |
| Working sets | | | | |
| Add project to working sets | | | New | |
| Working sets: | | \sim | Select | |
| Module Create module-info.java file | | | | |
| | | | | |
| ? | Back Next > | Finish | Canc | el |
| | | | | |

0.106 Shared Library Development - (Eclipse Java Jar Library)-8

• select finish

| New Java Project | | | - | _ □ | × |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------|-----------------------|----------------|------|
| Java Settings Define the Java build settings. | | | | | |
| Source Projects Libraries & Order and Expendence Projects Libraries & Order and Expendence Projects I Libraries | ort 🛈 Module [| Dependencies | | | |
| Details Create new source folder: use this if you want to add a | a new source folde | er to your project | | | |
| Link additional source: use this if you have a folder in | the file system that | it should be used | as additional sou | rce folder. | |
| Configure inclusion and exclusion filters: specify patter excluding each folder or file manually. | erns to the inclusio | on and exclusion | filters instead of ir | ncluding and | I |
| Remove source folder 'src' from build path: Children of included when building the project. | of the folder will n | ot be seen by the | compiler anymor | re and will no | t be |
| Allow output folders for source folders | | | | | |
| Default output folder: | | | | | |
| java-sample-lib/bin | | | | Browse | |
| | | | | | |
| ? | < Back | Next > | Finish | Cano | :el |
| | | | | | |

0.107 Shared Library Development - (Eclipse Java Jar Library)-9

• first we need to add a default package to keep everything organized



0.108 Shared Library Development - (Eclipse Java Jar Library)-10

• then we can create our class that includes our functions



0.109 Shared Library Development - (Eclipse Java Jar Library)-11

• give class a name

| 🖨 New Java Class | _ | | | × |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------|---|---------|---|
| Java Class Create a new Java o | class. | | C | |
| Source folder: | java-sample-lib/src | | Browse. | |
| Package: | ce103 | | Browse | |
| Enclosing type: | | | Browse | |
| Name: Modifiers: | JavaSampleLib Image private protected Image private protected |] | | |
| Superclass: | java.lang.Object | | Browse | |
| Interfaces: | | | Add | |
| | | | Remov | e |
| Which method stub | os would you like to create? | - | | |
| | ✓ public static void main(String[] args) | | | |
| | Constructors from superclass | | | |
| Do you want to add | Innerited abstract methods I comments? (Configure templates and default value <u>here</u>) Generate comments |) | | |
| ? | Finish | | Cancel | |

0.110 Shared Library Development - (Eclipse Java Jar Library)-12

• you will have following class with main



0.111 Shared Library Development - (Eclipse Java Jar Library)-13

• We will create sample java library with static functions as below.

```
package ce103;
```

```
import java.io.IOException;
public class JavaSampleLib {
   public static void sayHelloTo(String name) {
        if(name.isBlank() || name.isEmpty())
        {
            System.out.println("Hello "+name);
       }else {
            System.out.println("Hello There");
        }
   }
   public static int sum(int a,int b)
    {
        int c = 0;
        c = a+b;
        return c;
   }
   public static void main(String[] args) {
        // TODO Auto-generated method stub
       System.out.println("Hello World!");
        JavaSampleLib.sayHelloTo("Computer");
```

```
int result = JavaSampleLib.sum(5, 4);
System.out.println("Results is" + result);
System.out.printf("Results is %d \n", result);
try {
    System.in.read();
} catch (IOException e) {
    // TODO Auto-generated catch block
    e.printStackTrace();
}
```

}

0.112 Shared Library Development - (Eclipse Java Jar Library)-14

also we can add main method to run our library functions. If we run this file its process main function

| nt sum(int | a in | t h) | | |
|------------------------------------|--------------|----------------------|---------------|-------------------------------------|
| | \checkmark | Undo Typing | Ctrl+Z | |
| | | Revert File | | |
| | | Save | Ctrl+S | |
| | | Open Declaration | F3 | |
| <pre>pid main(St p-generated</pre> | | Open Type Hierarchy | F4 | |
| println("He | | Open Call Hierarchy | Ctrl+Alt+H | |
| ib coullelle | | Show in Breadcrumb | Alt+Shift+B | |
| = JavaSampl | | Quick Outline | Ctrl+O | |
| <pre>println("Re printf("Pos</pre> | | Quick Type Hierarchy | Ctrl+T | |
| princi (Res | | Open With | > | |
| | | Show In | Alt+Shift+W > | |
| <pre>in.read();</pre> | of | Cut | Ctrl+X | |
| Auto-gener | Ē | Сору | Ctrl+C | |
| StackTrace(| Þ | Copy Qualified Name | | |
| | Ē | Paste | Ctrl+V | |
| | Þ | Raw Paste | | |
| | | Quick Fix | Ctrl+1 | |
| | | Source | Alt+Shift+S > | |
| | | Refactor | Alt+Shift+T > | |
| Declaration | | Local History | > | |
| C:\Program F | | References | > | :15:35 AM) |
| | | Declarations | > | |
| | Q | Coverage As | > | |
| | 0 | Run As | > | J 1 Java Application Alt+Shift+X, J |
| | 苓 | Debug As | > | Run Configurations |
| | | Team | > | |
| | | Compare With | > | |
| | | Replace With | > | |
| | \checkmark | Validate | | |
| | | Preferences | | Writable Smart Insert |

0.113 Shared Library Development - (Eclipse Java Jar Library)-15

• we can see output from console as below

ecilpse-workspace - Java-sample-lib/sic/celus/JavasampleLib.java - Ecilpse iDE

File Edit Source Refactor Navigate Search Project Run Window Help 📸 + 🔚 🔞 + 😫 🕲 + 😫 * 💊 + 🔕 + 💁 + 🎱 * 🎥 🖉 🚽 🖗 + 🖗 + 🗇 + 🔁 + 🎦 📄 😫 🖇 🗖 🔲 🚺 JavaSampleLib.java 🗙 🕆 Package Explorer 🛛 package ce103; 🗸 🔛 java-sample-lib 1 > 🛋 JRE System Library [JavaSE-16] import java.io.IOException; 🗸 进 src 🗸 🆶 ce103 public class JavaSampleLib { 5 > 🚺 JavaSampleLib.java public static void sayHelloTo(String name) { 76 if(name.isBlank() || name.isEmpty()) 8 9 { System.out.println("Hello "+name); 10 11 }else { 12 System.out.println("Hello There"); 13 } 14 } 15 160 public static int sum(int a,int b) 17 18 int c = 0;19 c = a+b;20 return c; 21 } 22 23⊝ 24 public static void main(String[] args) { // TODO Auto-generated method stub
System.out.println("Hello World!"); 25 26 27 28 JavaSampleLib.sayHelloTo("Computer"); int result = JavaSampleLib.sum(5, 4); 29 30 31 32 33 34 System.out.println("Results is" + result); System.out.printf("Results is %d \n", result); try {
 System.in.read(); 35 } catch (IOException e) { 36 // TODO Auto-generated catch block 37 e.printStackTrace(); 38 } 39 40 } 41 42 } 43 1 🖹 Problems @ Javadoc 😣 Declaration 📮 Console 🗙 JavaSampleLib [Java Application] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (Oc Hello World! Hello There Results is9 Results is 9

0.114 Shared Library Development - (Eclipse Java Jar Library)-16

• There is no exe files java runtime environment run class files but we can export this as an executable.

| ile | Edit S | Source | Refactor | Navigate | Search | Project | Ru |
|----------|----------|-----------|-------------|----------|---------|----------|----|
| | New | | | | Alt+Sh | nift+N > | Ρ. |
| | Open Fi | le | | | | | |
| | Open P | rojects f | rom File Sy | stem | | | |
| | Recent | Files | | | | > | |
| | Close Ed | litor | | | C | trl+W | |
| | Close A | II Editor | 5 | | Ctrl+Sh | ift+W | |
|] | Save | | | | (| Ctrl+S | |
| 1 | Save As | | | | | | |
| ì | Save All | | | | Ctrl+S | hift+S | |
| | Revert | | | | | | |
| | Move | | | | | | |
| 1 | Rename | | | | | F2 | |
| | Refresh | | | | | F5 | |
| | Convert | Line De | limiters To | | | > | |
| 1 | Print | | | | 0 | Ctrl+P | |
| <u>5</u> | Import. | | | Export | | | |
| 5 | Export | | | | | | |
| | Properti | es | | | Alt+ | Enter | |
| | Switch \ | Norkspa | ice | | | > | |
| | Restart | | | | | | |
| | Exit | | | | | | |

0.115 Shared Library Development - (Eclipse Java Jar Library)-17

 \Box

Х

• Select Java->Runnable JAR File

Export

Select

Export all resources required to run an application into a JAR file on the local file system.

| Select an export wizard: | |
|------------------------------------|---|
| type filter text | |
| ✓ ➢ General | ^ |
| _ | |
| 🚇 Archive File | |
| 📮 File System | |
| Preferences | |
| V 🗁 Install | |
| 🔯 Installed Software Items to File | |
| 🗸 🧁 Java | |
| ↓ JAR file | |
| Avadoc | |
| 🖓 Runnable JAR file | |
| ✓ ➢ Run/Debug | |
| 🥊 Breakpoints | |
| 🔁 Coverage Session | |
| b Launch Configurations | ¥ |
| | |
| | |
| | |
| | |
| S < Back Next > Finish Cancel | |
| | |

0.116 Shared Library Development - (Eclipse Java Jar Library)-18 click next and set output path for jar file
| 🖨 Save As | | |
|-----------------------------------------------------------|----------------------------------------|------------------|
| \leftarrow \rightarrow \checkmark \uparrow \Box | This PC > Desktop > java-export-sample | |
| Organize 👻 New f | folder | |
| 💻 This PC | ^ Name | Date modified |
| 🧊 3D Objects | | No items match y |
| E Desktop | | |
| Documents | | |
| 👆 Downloads | | |
| 👌 Music | | |
| Pictures | | |
| 🚆 Videos | | |
| 🏪 Windows (C:) | | |
| ELENOVO (D:) | | |
| DATA (E:) | | |
| 💣 Network | ¥ | |
| File name: 🚺 | avaSampleLibExecutable | |
| Save as type: * | jar;*.zip | |
| ∧ Hide Folders | | |

0.117 Shared Library Development - (Eclipse Java Jar Library)-19

- If our project has several external dependecy then we can extract this required files (jar, so, dll) in seperated folder or we can combine them and generate a single executable jar
- Lets pack everthing together, Select launch configuration that has main function

| 🖨 Runnable JAR File | e Export | | _ | | \times |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------|----------------------|-------|----------|
| Runnable JAR File Select a 'Java Applic | Specification ation' launch cor | nfiguration to use | to create a runnable | JAR. | |
| Launch configuratio | n: | | | | |
| JavaSampleLib - jav | a-sample-lib | | | | ~ |
| Export destination: | | | | | |
| C:\Users\ugur.coru | h\Desktop\java-e | export-sample\Jav | aSampleLibExe v 🗸 | Brows | e |
| Library handling: C Extract required li Package required Copy required lib | braries into gene libraries into gen raries into a sub-t | rated JAR nerated JAR folder next to the g | generated JAR | | |
| Save as ANT scrip | t | | | | |
| ANT script location: | | | ~ | Brows | 2 |
| | | | | | |
| | | | | | |

0.118 Shared Library Development - (Eclipse Java Jar Library)-20

end of this operation we will have the following jar that we can by click

| 📙 🛃 📮 🛛 java-export-sampl | e | | | | _ | | × |
|---------------------------------------------------------------------------------------------|-----------|-------------------|---------|--------------|---------------------|---------|------------|
| File Home Share View | N | | | | | | ~ ? |
| \leftarrow \rightarrow \checkmark \uparrow \blacksquare \Rightarrow java-export | -sample | ~ | Ō | 🔎 Search jav | va-export-sample | | |
| EPSON Easy Photo Print 🔻 🔞 Ph | oto Print | | | | | | |
| 3.011 | ^ | Name | ^ | | Date modified | Туре | |
| 🖈 Quick access | | 🐇 JavaSampleLi | bExecut | able.iar | 10/24/2021 10:25 AM | Executa | able Jar F |
| E. Desktop | * | _ · · · · · · · · | | | | | |
| 🕂 Downloads | * | | | | | | |
| Documents | * | | | | | | |
| Pictures | * | | | | | | |
| c-sample-lib | | | | | | | |
| 🛃 Syllabus | | | | | | | |
| 🛃 Week-3 | | | | | | | |
| 🕢 Week-4 | | | | | | | |
| 🔵 OneDrive - Personal | | | | | | | |

0.119 Shared Library Development - (Eclipse Java Jar Library)-21

- When you click application if cannot run then try command line to see problem
- enter jar folder and run the following command

```
java -jar JavaSampleLibExecutable.jar
```

```
C:\Users\ugur.coruh\Desktop\java-export-sample>java -jar JavaSampleLibExecutable.jar
Exception in thread "main" java.lang.UnsupportedClassUersionError: ce103/JavaSampleLib has been compiled by a more rece
t version of the Java Runtime (class file version 60.0), this version of the Java Runtime only recognizes class file ve
sions up to 52.0
at java.lang.ClassLoader.defineClass(Native Method)
at java.lang.ClassLoader.defineClass(Unknown Source)
at java.net.URLClassLoader.defineClass(Unknown Source)
at java.net.URLClassLoader.defineClass(Unknown Source)
at java.net.URLClassLoader.defineClass(Unknown Source)
at java.net.URLClassLoaderfs[.run(Unknown Source)
at java.net.URLClassLoaderf.indClass(Unknown Source)
at java.net.URLClassLoaderf.indClass(Unknown Source)
at java.net.URLClassLoaderf.loadClass(Unknown Source)
at java.lang.ClassLoader.loadClass(Unknown Source)
at java.lang.ClassLoader.loadClass(Unknown Source)
at java.lang.Class.forName@(Native Method)
at org.eclipse.jdt.internal.jarinjarloader.JarRsrcLoader.main(JarRsrcLoader.java:59)
C:\Users\ugur.coruh\Desktop\java-export-sample>
```

In my case eclipse build JDK is newer than that I installed and set for my OS

If we check version we can see problem Java version $1.8.0_{231}$

```
C:\Users\ugur.coruh\Desktop\java-export-sample>java -showversion
java version "1.8.0_231"
Java(TM) SE Runtime Environment (build 1.8.0_231-b11)
Java HotSpot(TM) 64-Bit Server VM (build 25.231-b11, mixed mode)
Usage: java [-options] class [args...]
```

0.120 Shared Library Development - (Eclipse Java Jar Library)-22

We can found installed and builded JDK for our application from Eclipse setting

| eclipse-workspace - java-san | nple-lib/sr | c/ce103/Ja | vaSample | Lib.java | a - Eclipse I | DE | |
|---------------------------------|-------------|-------------|----------|------------|------------------|----------|----------|
| File Edit Source Refactor | Navigate | Search | Project | Run | Window | Help | |
| 📑 🗕 📄 🖶 🎯 🕶 🖻 |) 🔌 🕴 | 🤋 🗸 🚺 🔻 | • • | 9 - | ا 🔗 😂 | P 2 | |
| 🚦 Package Explorer 🗙 | | | | Į. | - € 8 | | Jav |
| ∨ 📂 java-sample-lib | | | | | | | 1 |
| > 🛋 JRE System Library [Jav | /aSE-16] | | | | | | 2 |
| ✓ (₱ src | Sho | w In | | | Alt+Sh | nift+W > | 4 |
| V H ce103 > JavaSampleLib.ja | Cop | у | | | (| Ctrl+C | 5 |
| | E Cop | y Qualified | Name | | | | 70 |
| | 💼 Past | te | | | | Ctrl+V | 8 |
| | 💥 Dele | ete | | | | Delete | 10 |
| | Buil | d Path | | | | > | 11 12 |
| | 🔤 Imp | ort | | | | | 13 14 |
| | 🖾 Exp | ort | | | | | 15 |
| | 🔗 Refi | esh | | | | F5 | 17 18 |
| | Pro | perties | | | Alt | +Enter | 19 |
| | | | | | | | 20 |
| | | | | | | | 22 |
| | | | | | | | 230 |
| | | | | | | | 24 |

0.121 Shared Library Development - (Eclipse Java Jar Library)-23

[•] select environments

| Properties for JRE System Libra | iry [JavaSE-16] | | - | | × |
|---------------------------------|----------------------------------|------------------------|-----------------|----------------|------|
| Classpath Container | JRE System Library | | | ⇔ • ⇔ | ▼ 00 |
| - | Select JRE for the project build | path. | | | |
| | System library | | | | |
| | • Execution environment: | JavaSE-16 (jdk-16.0.1) | ~ | Environment | 5 |
| | ○ Alternate JRE: | jdk-16.0.1 | \sim | Installed JREs | |
| | ○ Workspace default JRE (jo | lk-16.0.1) | | | |
| | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |
| ? | | | Apply and Close | Cancel | |

0.122 Shared Library Development - (Eclipse Java Jar Library)-24

• select installed JRE or JDK

| Preferences (Filtered) | | | _ | |
|----------------------------|---------------------------------------------------------------------|------------------------------------------------|--------------------|-------------------|
| type filter text X | Installed JREs | | | ↓ ↓ ↓ 8 |
| ✓ Java > Installed JREs | Add, remove or edit JR newly created Java pro Installed JREs: | E definitions. By default, the check jects. | ed JRE is added to | the build path of |
| | Name | Location | Туре | Add |
| | 🗹 🛋 jdk-16.0.1 | C:\Program Files\Java\jdk-16 | Standard | Edit |
| | | | | Duplicate |
| | | | | Remove |
| | | | | Search |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | Apply |
| ? 🎽 🖌 🖲 | | А | pply and Close | Cancel |

0.123 Shared Library Development - (Eclipse Java Jar Library)-25

• you can see installed JRE or JDK home

C:\Program Files\Java\jdk-16.0.1

| 🖨 Edit JRE | | | | × |
|--------------------------------------------|----------------------------------|-------|---------------|------|
| JRE Definition Specify attributes for a | IRE | | | R |
| JRE home: | C:\Program Files\Java\jdk-16.0.1 | | Directo | ry |
| JRE name: | jdk-16.0.1 | | | |
| Default VM arguments: | | | Variable | es |
| JRE system libraries: | | | | |
| > 🚮 C:\Program Files | \Java\jdk-16.0.1\lib\jrt-fs.jar | Add | d External JA | ARs |
| | | Java | adoc Locati | on |
| | | Sour | rce Attachm | ient |
| | | Exter | nal annotat | ions |
| | | | Remove | |
| | | | Up | |
| | | | Down | |
| | | R | estore Defa | ult |
| ? | Fini | sh | Canc | el |

0.124 Shared Library Development - (Eclipse Java Jar Library)-26

• Open system environment to fix this problem

| All | Apps | Documents | Web | More 🔻 | |
|------------|--------------------------------|----------------------------|-----------|--------|--|
| Best ma | atch | | | | |
| 9 | System (App | Configuration | | > | |
| Setting | s | | | | |
| 🤰 Ed va | lit the sy s riables | stem environn | nent | | |
| 👱 Sy | stem | | | > | |
| ඩු Re | set this F | РС | | > | |
| 🐼 Re | covery | | | > | |
| ඩු Re | covery o | ptions | | > | |
| (i) Ak | out you | r PC | | > | |
| 🗆 Ta | skbar no | tification area | | > | |
| i Se ve | e if you l rsion of \ | nave a 32-bit (Windows | or 64-bit | > | |
| Search | the web | | | | |
| , | ste - See v | web results | | > | |
| Apps (7 | (+) | | | | |
| | | | | | |

0.125 Shared Library Development - (Eclipse Java Jar Library)-27

| System Properties | × |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Computer Name Hardware Advanced System Protection Remote | |
| You must be logged on as an Administrator to make most of these changes. Performance Visual effects, processor scheduling, memory usage, and virtual memory Settings | |
| User Profiles Desktop settings related to your sign-in Settings | |
| Startup and Recovery System startup, system failure, and debugging information Settings | |
| Environment Variables |] |
| OK Cancel Apply | |

0.126 Shared Library Development - (Eclipse Java Jar Library)-28

• Check user settings first

Environment Variables

| Variable | Value | ^ |
|------------------------------|---------------------------------------------------------------------|------------|
| ChocolateyLastPathUpdate | 132416153103954791 | |
| GOPATH | C:\Users\ugur.coruh\go | |
| IntelliJ IDEA Community Edit | C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1.1 | |
| OneDrive | C:\Users\ugur.coruh\OneDrive | |
| OneDriveConsumer | C:\Users\ugur.coruh\OneDrive | |
| Path | C:\Program Files\Java\jdk-16.0.1\bin;C:\Python27;C:\Users\ugur.co | |
| TEMP | C:\Users\ugur.coruh\AppData\Local\Temp | ` ~ |

 \times

| /ariable | Value | ^ |
|----------------------|----------------------------------------|---|
| asl.log | Destination=file | |
| ChocolateyInstall | C:\ProgramData\chocolatey | |
| CHOKIDAR_USESPOLLING | true | |
| ComSpec | C:\WINDOWS\system32\cmd.exe | |
| onfigsetroot | C:\WINDOWS\ConfigSetRoot | |
| DriverData | C:\Windows\System32\Drivers\DriverData | |
| AVA HOME | C:\Program Files\Java\idk-16.0.1\ | ~ |
| | New Edit Delete | |

U

0.127 Shared Library Development - (Eclipse Java Jar Library)-29

| dit environment variable | × |
|-------------------------------------------------------------------|-----------|
| | |
| C:\Program Files\Java\jdk-16.0.1\bin | New |
| C:\Python27 | |
| C:\Users\ugur.coruh\AppData\Local\Microsoft\WindowsApps | Edit |
| C:\Users\ugur.coruh\AppData\Local\Programs\Microsoft VS Code\bin | |
| C:\Program Files\MiKTeX\miktex\bin\x64 | Browse |
| C:\Users\ugur.coruh\AppData\Roaming\npm | |
| C:\Users\ugur.coruh\AppData\Local\GitHubDesktop\bin | Delete |
| C:\Program Files\curl-7.71.1-win64-mingw\bin | · |
| C:\Users\ugur.coruh\go\bin | |
| C:\Program Files (x86)\Python38-32 | Move Up |
| C:\Program Files (x86)\Python38-32\Scripts | |
| C:\Users\ugur.coruh\AppData\Roaming\Python\Python38\Scripts | Move Down |
| C:\Program Files\mingw-w64\x86_64-8.1.0-win32-seh-rt_v6-rev0\min | |
| C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\VC\ | |
| %IntelliJ IDEA Community Edition% | Edit text |
| %USERPROFILE%\.dotnet\tools | |
| %USERPROFILE%\go\bin | |
| C:\asn1c | |
| | |
| | |
| | |
| | |
| ОК | Cancel |
| | |

0.128 Shared Library Development - (Eclipse Java Jar Library)-30

• Check system settings

| Variable | Value | ^ |
|------------------------|--------------------------------------------------------------------|---|
| Path | C:\Program Files\Java\jre1.8.0_231\bin;C:\Program Files\Java\jdk-1 | |
| PATHEXT | .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.PY;.PYW | |
| PROCESSOR_ARCHITECTURE | AMD64 | |
| PROCESSOR_IDENTIFIER | Intel64 Family 6 Model 94 Stepping 3, GenuineIntel | |
| PROCESSOR_LEVEL | 6 | |
| PROCESSOR_REVISION | 5e03 | |
| PSModulePath | %ProgramFiles%\WindowsPowerShell\Modules:C:\WINDOWS\svst | ~ |
| | New Edit Delete | |
| | OK Cancel | |

0.129 Shared Library Development - (Eclipse Java Jar Library)-31

| environment variable | | |
|----------------------------------------------------------------|---|-----------|
| C:\Program Files\Java\jre1.8.0_231\bin | ^ | New |
| C:\Program Files\Java\jdk-16.0.1\bin | | |
| C:\Python27\ | | Edit |
| C:\Python27\Scripts | | |
| C:\Program Files\Amazon Corretto\jdk11.0.8_10\bin | | Browse |
| C:\Program Files (x86)\Intel\Intel(R) Management Engine Compon | | |
| C:\Program Files\Intel\Intel(R) Management Engine Components\i | | Delete |
| C:\ProgramData\Anaconda3 | | |
| C:\ProgramData\Anaconda3\Library\mingw-w64\bin | | |
| C:\ProgramData\Anaconda3\Library\usr\bin | | Move Up |
| C:\ProgramData\Anaconda3\Library\bin | | |
| C:\ProgramData\Anaconda3\Scripts | | Move Down |
| C:\Program Files (x86)\Python38-32\Scripts\ | - | |
| C:\Program Files (x86)\Python38-32\ | | |
| C:\Program Files\Python38\Scripts\ | | Edit text |
| C:\Program Files\Python38\ | | |
| C:\Windows\system32 | | |
| C:\Windows | | |
| C:\Windows\System32\Wbem | | |
| C:\Windows\System32\WindowsPowerShell\v1.0\ | | |
| | * | |

0.130 Shared Library Development - (Eclipse Java Jar Library)-32

- we will move up the JDK 16 configuration then command line will run first java

Edit environment variable

| C:\Program Files\Java\jdk-16.0.1\bin | ^ | New |
|----------------------------------------------------------------|---|-----------|
| C:\Program Files\Java\jre1.8.0_231\bin | | |
| C:\Python27\ | | Edit |
| C:\Python27\Scripts | | |
| C:\Program Files\Amazon Corretto\jdk11.0.8_10\bin | | Browse |
| C:\Program Files (x86)\Intel\Intel(R) Management Engine Compon | | |
| C:\Program Files\Intel\Intel(R) Management Engine Components\i | | Delete |
| C:\ProgramData\Anaconda3 | | |
| C:\ProgramData\Anaconda3\Library\mingw-w64\bin | | |
| C:\ProgramData\Anaconda3\Library\usr\bin | | Move Up |
| C:\ProgramData\Anaconda3\Library\bin | | |
| C:\ProgramData\Anaconda3\Scripts | | Move Down |
| C:\Program Files (x86)\Python38-32\Scripts\ | | |
| C:\Program Files (x86)\Python38-32\ | | |
| C:\Program Files\Python38\Scripts\ | | Edit text |
| C:\Program Files\Python38\ | | |
| C:\Windows\system32 | | |
| C:\Windows | | |
| C:\Windows\System32\Wbem | | |
| C:\Windows\System32\WindowsPowerShell\v1.0\ | | |
| | * | |
| | | |
| OK | | Cancel |

 \times

0.131 Shared Library Development - (Eclipse Java Jar Library)-33

• Also in system setting check JAVA_HOME

| ystem variables | |
|----------------------|-----------------------------------|
| Variable | Value |
| JAVA_HOME | C:\Program Files\Java\jdk-16.0.1\ |
| MOSQUITTO_DIR | C:\Program Files\mosquitto |
| NUMBER_OF_PROCESSORS | 8 |
| OS | Windows NT |

0.132 Shared Library Development - (Eclipse Java Jar Library)-34

- After this settings close current command line and open new one
- Write

java --version

• if you see java version updated and 16.0.1 then settings are correct

C:\WINDOWS\system32\cmd.exe

```
licrosoft Windows [Version 10.0.19043.1288]
(c) Microsoft Corporation. All rights reserved.
C:\Users\ugur.coruh>java --version
java 16.0.1 2021-04-20
Java(TM) SE Runtime Environment (build 16.0.1+9-24)
Java HotSpot(TM) 64-Bit Server VM (build 16.0.1+9-24, mixed mode, sharing)
C:\Users\ugur.coruh>
```

0.133 Shared Library Development - (Eclipse Java Jar Library)-35

and now if we enter and run application as follow we will see output



0.134 Shared Library Development - (Eclipse Java Jar Library)-36

- But when you click this jar its not running as you see so we have options to provide a clickable application there
- Launch4j is an option here
 - Launch4j Cross-platform Java executable wrapper¹⁰

 $^{10} \rm http://launch4j.sourceforge.net/index.html$



0.135 Shared Library Development - (Eclipse Java Jar Library)-37

- you can watch this tutorial also
 - How to convert jar to exe using Launch4J Full explanation YouTube¹¹

0.136 Shared Library Development - (Eclipse Java Jar Library)-38

• Download and install launch4j and open application

 $^{^{11}} https://www.youtube.com/watch?v=MyMPPuYGN-U\&ab_channel=GoXR3PlusStudio$

| Best match | |
|---------------------|---|
| Launch4j App | |
| Settings | |
| 序 Language settings | > |

0.137 Shared Library Development - (Eclipse Java Jar Library)-39

• Configure your application settings similar to below select jar file and exe output path

| 🅌 Launch4j 3.14 - Ja | SampleLibExecutable.xml | | | _ | × |
|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------|---|---|
| 1 🖻 🖬 🏟 | ▶ ? | | | | |
| Basic Classpath | Header Single instance JRE Set env. | variables Splash | Version Info Messages | ; | |
| * Output file: | C:\Users\uqur.coruh\Desktop\java-export-sampl | e\JavaSampleLibExecuta | able.exe | | |
| * Jar: | C:\Users\ugur.coruh\Desktop\java-export-sampl | e\JavaSampleLibExecuta | able.jar | | |
| | Dont't wrap the jar, launch only | | | | |
| Wrapper manifest: | | | | | |
| lcon: | | | | | |
| Change dir: | | | | | |
| Command line args: | | | | | |
| Process priority: | 🖲 Normal 🗌 Idle 📄 High | | | | |
| Options | Stay alive after launching a GUI application | | | | |
| | Restart the application after a crash | | | | |
| Java download and s | port | | | | |
| Error title: | JavaSampleLibExecutable | | | | |
| Java download URL: | http://java.com/download | | | | |
| Support URL: | | | | | |
| Log | | | | | |
| Compiling resource Linking Wrapping WARNING: Sign the Successfully created | xecutable to minimize antivirus false positives or C:\Users\ugur.coruh\Desktop\java-export-sample | use launching instead o \JavaSampleLibExecuta | f wrapping. ble.exe | | |

0.138 Shared Library Development - (Eclipse Java Jar Library)-40

• We can customize main class if have multiple main class



0.139 Shared Library Development - (Eclipse Java Jar Library)-41

select console from setting for this application

| 실 Launch4j 3.14 - Ja | vaSampleLibExecutable.xml | _ | × |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|
| 1 🖿 🖬 🚳 | | | |
| Basic Classpath | Header Single instance JRE Set env. variables Splash Version Info Messages | | |
| Header type: | GUI Console JNI GUI (beta) JNI Console (beta) | | |
| Custom header - link | er options | | |
| Object files: | w32api/crt2.o head/consolehead.o head/head.o | | |
| 🗌 w32api: | w32api/libmingw32.a w32api/libgc.a w32api/libmoldname.a w32api/libkernel32.a w32api/libadvapi32.a w32api/libashel132.a | | |
| Log | | | |
| Compiling resource Linking Wrapping WARNING: Sign the Successfully created | s executable to minimize antivirus false positives or use launching instead of wrapping. I C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLibExecutable.exe | | |

0.140 Shared Library Development - (Eclipse Java Jar Library)-42

• we can provide a single running application, this setting avoid to run multiple instances

| 🕌 Launch4j 3.14 - Ja | vaSampleLib | Executable.xml | | | | | | - | | × |
|-------------------------------|---------------|-----------------------|------------|-------------------------|--------------|----------------|----------|---|---|---|
| i 🖻 🖬 🏟 | ? | | | | | | | | | |
| Basic Classpath | Header | Single instance | JRE | Set env. variables | Splash | Version Info | Messages | | | |
| | Allow or | nly a single instance | of the a | application | | | | | | |
| * Mutex name | | | | | | | | | | |
| Window title | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| Log | - | | | | | | | | | |
| Linking | 5 | | | | | | | | | |
| Wrapping WARNING: Sign the | executable | to minimize antiviru | ıs false p | positives or use launch | hing instead | l of wrapping. | | | | |
| Successfully created | l C:\Users\ug | gur.coruh\Desktop\ | java-exp | port-sample\JavaSam | pleLibExecu | itable.exe | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | _ | |

0.141 Shared Library Development - (Eclipse Java Jar Library)-43

• we need to set runtime environment versions

| JavaSampleLibExe | ecutable.xr | ml | | | | | | | × |
|--------------------|------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|
| ⇒ ▶ ? | | | | | | | | | |
| n Header Si | ingle insta | ance JRE | Set env. variables | Splash | Version Info | Messages | | | |
| s: | | | | | | | 64-bit | Fallback | option |
| | | | | | | | | | |
| n: 16.0.1 | | Prefer public | : JRE, but use JDK run | time if new | er | | | | \sim |
| n: 17.0.1 | | First 64-bit, t | hen 32-bit | | | | | | \sim |
| | | | | | | | | | |
| e: | MB | | % of available | memory | | | | | |
| e: | MB | | % of available | memory | | | | | |
| s | | | | | | | | | |
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| | | | | | | | | | |
| y: EXEDIR | | | | | | ~ | Property | 🕀 🕀 | otion |
| in l | | | | | | | Property | 🕀 Op | otion |
| | | | | | | | | | |
| ces | | | | | | | | | |
| | | | | | | | | | |
| he executable to n | ninimize a | ntivirus false p | oositives or use launc | hing instead | d of wrapping. | | | | |
| ed C:\Users\ugur. | coruh\Des | sktop\java-exp | oort-sample\JavaSam | pleLibExect | utable.exe | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | JavaSampleLibExe | JavaSampleLibExecutable.xr | JavaSampleLibExecutable.xml | JavaSampleLibExecutable.xml | JavaSampleLibExecutable.xml | JavaSampleLibExecutable.xml A Header Single instance JRE Set env. variables Splash Version Info In Header Single instance JRE Set env. variables Splash Version Info In 16.0.1 Prefer public JRE, but use JDK runtime if newer In 17.0.1 First 64-bit, then 32-bit In 17.0.1 First 64-bit, then 32-bit In MB % of available memory In MB % of available memory In K Set EDIR In K Set EDIR In K Set EDIR In K Set Executable to minimize antivirus false positives or use launching instead of wrapping. In K Set C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLibExecutable.exe | JavaSampleLibExecutable.xml Header Single instance JRE Set env. variables Splash Version Info Messages Int 16.0.1 Prefer public JRE, but use JDK runtime if newer IT.0.1 First 64-bit, then 32-bit ee MB % of available memory ee MB % of available memory state Ces he executable to minimize antivirus false positives or use launching instead of wrapping. ted C\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLibExecutable.exe | JavaSampleLibExecutable.xml | JavaSampleLibExecutable.xml |

0.142 Shared Library Development - (Eclipse Java Jar Library)-44

you can set system parameters before running application

| 🛓 Lau | nch4j 3.14 - Ja | avaSampleLib | Executable.xml | | | | | | _ | × |
|------------------------------------------------|--------------------------------------------------------------------|---------------------------------------|--------------------------------------------|------------------------|------------------------------------------------|-----------------------------|------------------------------|----------|---|---|
| 4 | E 💮 | \geqslant | | | | | | | | |
| Basic | Classpath | Header | Single instance | JRE | Set env. variables | Splash | Version Info | Messages | | |
| | Set variables: | | | | | | | | | |
| Log Comj Linkir Wrap WARI Succe | piling resource ng ping NING: Sign the essfully create | es e executable t d C:\Users\ug | o minimize antiviru Jur.coruh\Desktop\j | ıs false ı java-exj | positives or use launch port-sample\JavaSam | ning instead oleLibExecu | ł of wrapping. Itable.exe | | | |

0.143 Shared Library Development - (Eclipse Java Jar Library)-45

• with splash screen you can show a splash screen image for your application

| 실 Launch4j 3.14 - Ja | vaSampleLik | Executable.xml | | | | | | | _ | | × |
|----------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------|-----------------------|-----------------------------------------------|-----------------------------|------------------------------|----------|-----------|-----------|-----------|----------|
| 🖬 🖿 🖬 🏟 | | | | | | | | | | | |
| Basic Classpath | Header | Single instance | JRE | Set env. variables | Splash | Version Info | Messages | | | | |
| | Enable s | plash screen | | | | | | | | | |
| * Splash file: | | | | | | | | | | | |
| Wait for window | ✓ Close sp | alash screen when ar | n applic | ation window appear | s | | | | | | |
| * Timeout [s]: | 60 | | | | | | | | | | |
| | 🗹 Signal e | rror on timeout | | | | | | | | | |
| | | | | | | | | True sign | als an en | ror on sp | lash tim |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Log | | | | | | | | | | | |
| Compiling resource Linking Wrapping WARNING: Sign the Successfully created | s executable d C:\Users\ug | to minimize antiviru gur.coruh\Desktop\j | is false i ava-exp | oositives or use launc oort-sample\JavaSam | hing insteac pleLibExect | l of wrapping. Itable.exe | | | | | |
| | | | | | | | | | | | |

0.144 Shared Library Development - (Eclipse Java Jar Library)-46

• File attributes such as version product information is configured from version info tab

| 🕌 Launch4j 3.14 - Ja | vaSampleLibExecutable.xml | - 🗆 X |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1 🖻 🖬 🏟 | | |
| Basic Classpath | Header Single instance JRE Set env. variables Splash Version Info Messages | |
| * File version: | Add version information 1.0.0.1 Free form: 1.0.0 | |
| File description: | JavaSampleLibExecutable CE 103 | |
| Copyright: | Ugur Coruh | |
| Additional information | n | |
| * Product version: | 1.0.0.1 * Free form: 1.0.0 | |
| * Product name: | Java Sample Lib Exe | |
| Company name: | CENG | |
| * Internal name: | Jar Launcher | |
| * Original filename: | JavaSampleLibExecutable.exe | |
| Trademarks: | | |
| Language: | Turkish V | |
| Log Compiling resource Linking Wrapping WARNING: Sign the Successfully created | s executable to minimize antivirus false positives or use launching instead of wrapping. I C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLibExecutable.exe | |

0.145 Shared Library Development - (Eclipse Java Jar Library)-47

if your application runtime condition has an error then you can show this customized messages also

| 🕌 Launch4j 3.14 - Jav | vaSampleLib | Executable.xml | | | | | | | - | | × |
|----------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------|----------------------|------------------------------------------------|-----------------------------|------------------------------|------------------|---------|-----------|---------|----------|
| 1 🖻 🖬 🏟 | | | | | | | | | | | |
| Basic Classpath | Header | Single instance | JRE | Set env. variables | Splash | Version Info | Messages | | | | |
| | Add cus | tom messages | | | | | | | | | |
| Startup error: | An error oc | curred while startin: | g the ap | oplication. | | | | | | | |
| Bundled JRE error: | This applic | ation requires a Java | Runtim | ne Environment. | | | | | | | |
| JRE version error: | This applic | ation requires a Java | Runtim | ne Environment | | | | Launch4 | j will ap | ppend t | he requi |
| Launcher error: | The registry | y refers to a nonexis | tent Jav | a Runtime Environme | ent installat | ion or the runtin | ne is corrupted. | | | | |
| Inst. already exists: | An applicat | tion instance is alrea | idy runr | ning. | | | | | | | |
| Loa | | | | | | | | | | | |
| Compiling resource Linking Wrapping WARNING: Sign the Successfully created | s executable t I C:\Users\ug | to minimize antiviru gur.coruh\Desktop\j | s false p ava-exp | oositives or use launci oort-sample\JavaSam | hing instead pleLibExect | d of wrapping. utable.exe | | | | | |

0.146 Shared Library Development - (Eclipse Java Jar Library)-48

• with this options save configuration file xml



0.147 Shared Library Development - (Eclipse Java Jar Library)-49

• and compile settings

| 🛓 Laun | ch4j 3.14 - Ja | vaSampleLib | Exec |
|--------|----------------|-------------|------|
| 1 🖻 | R 🔅 | | |
| Basic | Classpath | Header | Sii |

0.148 Shared Library Development - (Eclipse Java Jar Library)-50

• You will see generated output file in log screen

Compiling resources Linking Wrapping WARNING: Sign the executable to minimize antivirus false positives or use launching instead of wrapping Successfully created C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLibExecutable.exe

0.149 Shared Library Development - (Eclipse Java Jar Library)-51

|] 🚽 🗧 java-export-sample | | | | | |
|-----------------------------------|----|------------------|--------|------------|-------------------|
| Home Share View | | | | | |
| 🔹 🛧 📙 > java-export-sample | 2 | ~ | ී | 🔎 Search j | ava-export-sample |
| 🛛 Easy Photo Print 👻 🔞 Photo Prir | nt | | | | |
| | ^ | Name | ^ | | Date modified |
| uick access | | 🔳 JavaSamplel ib | Evecut | able eve | 10/24/2021 11:0 |
| Desktop 📌 | | AvaSampleLib | Execut | able iar | 10/24/2021 10:2 |
| Downloads 💉 | | | Execut | able yml | 10/24/2021 10:2 |
| Documents 💉 | | | Execut | abie.xmi | 10/24/2021 11:0 |
| Pictures 💉 | | | | | |
| c-sample-lib | | | | | |
| Syllabus | | | | | |
| Week-3 | | | | | |



0.150 Shared Library Development - (Eclipse Java Jar Library)-52 another option here adding a bat file to run current jar file

0.151 Shared Library Development - (Eclipse Java Jar Library)-53 JavaSampleLibExecutable.bat

java -jar JavaSampleLibExecutable.jar

| (port-sample | ໍ ເ⊂ັ v Search j | ava-export-sai |
|--------------|-------------------------------|----------------|
| Photo Print | | |
| ^ | Name | Date r |
| | JavaSampleLibExecutable.exe | 10/24, |
| * | 🕌 JavaSampleLibExecutable.jar | 10/24/ |
| * | 📓 JavaSampleLibExecutable.xml | 10/24/ |
| * | JavaSampleLibExecutable.bat | 10/24/ |
| * | | |
| | | |
| | | |
| | | |

• if we click bat file then we will automate command line task for current jar file



0.152 Shared Library Development - (Eclipse Java Jar Library)-54

Now return back to our java library and create another console application that use library functions

| eclipse-workspace | e - java-sample-lib/src/ | ce103/JavaSampleLib.java | - Eclip | se IDE | | |
|-------------------|--------------------------|-------------------------------------------|----------|---------------------|--------------|---------------------|
| File Edit Source | Refactor Navigate | Search Project Run | Windo | ow Help | | |
| 🖻 🗝 🗐 👘 🖶 | 0 - 🗐 🖉 🞋 | • 🜔 • 💁 • 💁 • | ام 😂 | 9 - 19 🥖 | R I T | 图 • 图 • |
| 🛱 Package Explore | r× | le la | 5 | 8 🗆 🗖 | 🕽 JavaSamp | oleLib.java $	imes$ |
| > 📂 java-sample-l | ib | | | | 1 packa 2 | ge ce103; |
| | | | | | 3 impor | t java.io.I |
| | | | | | 5 publi | c class Jav |
| | | | | | 6 | |
| | New | | > 😕 | Java Project | | f(name, |
| | Show In | Alt+Shift+W | , 🖻 | Project | | |
| | Сору | Ctrl+C | ŧ | Package | Create a Ja | else { |
| | Copy Qualified Name | | Ø | Class | | Syst |
| (îi) | Paste | Ctrl+V | C | Interface | | |
| 36 | Delete | Delete | G | Enum | | c stati |
| R×1 | Import | | 6 | Record | | |
| r_3 | Export | | @ | Annotation | | nt c = a+b: |
| | D () | | - 10 | Source Fold | er | eturn c |
| S. | Refresh | 61 | _ ~ | Java Workin | ig Set | |
| | | | ~ | Folder | | c stati |
| | | | | File | | / TODO |
| | | | -0 | | | Victor c |

0.153 Shared Library Development - (Eclipse Java Jar Library)-55

| 🚍 New Java Project | | | | _ | | × |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------|--------|---------|-------------------|----------|
| Create a Java Project Create a Java project in the workspace or in an external location. | | | | | | - |
| Project name: java-sample-app Use default location Location: C:\Users\ugur.coruh\eclipse-workspace\java-sample-app JRE Image: I | JavaSE-1 | 6 | | | Browse | ~ |
| Use a project specific JRE: Use default JRE 'jdk-16.0.1' and workspace compiler preferences | jdk-16.0. | 1 | | Cont | figure JRE | <u> </u> |
| Project layout Use project folder as root for sources and class files Create separate folders for sources and class files Working sets Add project to working sets | | | 1 | Configu | ure defaul New | <u>t</u> |
| Working sets: | | | | | Select | |
| Create module-info.java file | | | | | | |
| ? | Back | Next > | Finish | | Cance | 2 |

0.154 Shared Library Development - (Eclipse Java Jar Library)-56

| 🖨 New Java Project | _ | | × |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------|----|
| Java Settings Define the Java build settings. | | | - |
| Source Projects Libraries Order and Export Order and Export Module Dependencies Projects Projects Libraries Order and Export Order and Export Module Dependencies Project Project Project Project Project Pr | source f | older. ages and | |
| Default output folder: | | | |
| java-sample-app/bin | | Browse | |
| O Kext > Finish | | Canc | el |

0.155 Shared Library Development - (Eclipse Java Jar Library)-57

• You can set libraries in this step from but our library should exported for our solution



0.156 Shared Library Development - (Eclipse Java Jar Library)-58

• Select Add External JARs...



0.157 Shared Library Development - (Eclipse Java Jar Library)-59

• Open Exported jar folder and select

Selection



0.158 Shared Library Development - (Eclipse Java Jar Library)-60

• Or we can select by Add jar from current workspace





0.159 Shared Library Development - (Eclipse Java Jar Library)-61 but in this step I won't add anything I'll add references later



0.160 Shared Library Development - (Eclipse Java Jar Library)-62

• we will have the following project



0.161 Shared Library Development - (Eclipse Java Jar Library)-63

• lets create a package

| Pack | age E | xplorer \times | | | E | ÷ € : □ | J Jav | vaSampleL | .ib.java $	imes$ | |
|------------|-------|------------------|---------------|---------------|------------|----------------|----------|-----------|--------------------|--------------------|
| · 🔁 ja | va-sa | mple-app | | | | | 1 2 | package | ce103; | |
| > 🖬 | | New | | > | 鬯 | Java Project | | rt | java.io.I | 0Exceptio |
| i 😅 ja | | Open in N | ew Window | | D | Project | | ic | class Jav | aSampleLi |
| > = ~ @ | | Open Type | Hierarchy | F4 | ₿ | Package | | pub | lic stati | c void sa |
| ~ | | Show In | | Alt+Shift+W > | 0 | Class Create a | Java pao | :kage | if(name. | isBlank() |
| | | Show in Lo | ocal Terminal | > | C | Interface | | | ۱ Syst | em. <i>out</i> .pr |
| | P | Сору | | Ctrl+C | G | Enum | | | <pre>}else {</pre> | |
| | | Copy Qual | ified Name | | ß | Record | | | } | em.out.pr |
| | ß | Paste | | Ctrl+V | @ | Annotation | | } | - | |
| | × | Delete | | Delete | ₽ 3 | Source Folder | | nub | lic stati | c int sum |
| | | | | | | | | | | |

0.162 Shared Library Development - (Eclipse Java Jar Library)-64

| 🖨 New Java Package | | | | \times |
|-------------------------------------------|--------------------------------------------------|-------------|------|----------|
| Java Package Create a new Java package | | | _ | |
| Creates folders correspondir | ng to packages. | | | |
| Source folder: | java-sample-app/src | | Brov | wse |
| Name: | ce103 | | | |
| Create package-info.java | | | | |
| Generate comments | (configure templates and default value <u>he</u> | <u>re</u>) | | |
| ? | Finish | | Can | cel |
| | | | | |

0.163 Shared Library Development - (Eclipse Java Jar Library)-65

• and lets create a main class for our application


0.164 Shared Library Development - (Eclipse Java Jar Library)-66

• check create main function

| 🖨 New Java Class | | | × |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|
| Java Class Create a new Java c | lass. | C | |
| Source folder: | java-sample-app/src | Browse. | |
| Package: | ce103 | Browse. | |
| Enclosing type: | | Browse. | |
| Name: Modifiers: | JavaSampleApp public Opackage private protected abstract final static | | |
| Superclass: | java.lang.Object | Browse. | |
| Interfaces: | | Add | e |
| Which method stub | s would you like to create? | | |
| Do you want to add | public static void main(String[] args) Constructors from superclass Inherited abstract methods comments? (Configure templates and default value here) Generate comments | | |
| ? | Finish | Cancel | |

0.165 Shared Library Development - (Eclipse Java Jar Library)-67



0.166 Shared Library Development - (Eclipse Java Jar Library)-68

• right click to project and add reference i 🗂 🕶 🔚 🐚 🖶 🎯 🖛 🖳 🔌 🐺 🕶 🔘 🖛 🎴 📲 🥙 🔗 🖛 🍄 🥖 💷 💷 👘 🖉 🖛 🏷 🖓 JavaSampleLib.java Package Explorer × E ¢3 J Javas 🗸 📂 java-sample package ce103; 1 New > 2 🗸 🕭 src 3 public class JavaSample Go Into 4 > 🚺 Jav 50 public static void Open in New Window > 🛋 JRE Syste 6 // TODO Auto-ge Open Type Hierarchy F4 7 🗸 📂 java-sample 8 Alt+Shift+W > > 🛋 JRE Syste Show In } 9 🗸 🕭 src Show in Local Terminal > 10 } 🗸 🆶 ce103 11 > 🕽 Jav 🗎 Copy Ctrl+C Copy Qualified Name Ð Paste Ctrl+V ß Delete Delete × **Build Path** Link Source... > 踻 Alt+Shift+S > Source New Source Folder... ÆŶ Refactor Alt+Shift+T > Use as Source Folder Import... 010 Add External Archives... ല Export... Add Libraries... ഹ =1 Refresh F5 Configure Build Path... ନ୍ତି Ň. Close Project Close Unrelated Project Assign Working Sets...

0.167 Shared Library Development - (Eclipse Java Jar Library)-69

• you can enter same configurations from project properties



0.168 Shared Library Development - (Eclipse Java Jar Library)-70

Lets export our library as a JAR file and then add to our classpath

| | New | > |
|---|------------------------|---------------|
| | Go Into | |
| | Open in New Window | |
| | Open Type Hierarchy | F4 |
| | Show In | Alt+Shift+W > |
| | Show in Local Terminal | > |
| Đ | Сору | Ctrl+C |
| Ð | Copy Qualified Name | |
| Ē | Paste | Ctrl+V |
| × | Delete | Delete |
| | Build Path | > |
| | Source | Alt+Shift+S > |
| | Refactor | Alt+Shift+T > |
| è | Import Export | |
| 4 | Export | |
| S | Refresh | F5 |
| | | |

0.169 Shared Library Development - (Eclipse Java Jar Library)-71 Select JAR file



0.170 Shared Library Development - (Eclipse Java Jar Library)-72

we configured output as

 $\verb|C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleLib.jar||$



| JAR file: | C:\Users\ugur.cor | uh\Desktop\java-ex | port-sample\Jav | ∕aSampleLib.ja ∨ | Browse |
|------------------------------------|---------------------------------------------------------------------|----------------------------------|-----------------|------------------|--------|
| Options: Comp Add d Overv | oress the contents o lirectory entries write existing files w | f the JAR file ithout warning | | | |
| ? | | < Back | Next > | Finish | Cancel |

0.171 Shared Library Development - (Eclipse Java Jar Library)-73

| JAR Export | — | | \times |
|---------------------------------------------------------------------------------------------------------------------------|---|--------|----------|
| JAR Packaging Options Define the options for the JAR export. | | | 0 |
| Select options for handling problems: Export class files with compile errors Export class files with compile warnings | | | |
| Create source folder structure | | | |
| Build projects if not built automatically | | | |
| Save the description of this JAR in the workspace | | | |
| Description file: | | Browse | |
| ? < Back Next > Finish | 1 | Cance | el |

0.172 Shared Library Development - (Eclipse Java Jar Library)-74

| JAR Export - | | × |
|-----------------------------------------------------------------------------|----------|------|
| JAR Manifest Specification Customize the manifest file for the JAR file. | | 5 |
| Specify the manifest: | | |
| Generate the manifest file | | |
| Save the manifest in the workspace | | |
| Use the saved manifest in the generated JAR description file | | |
| Manifest file: | Browse. | |
| ○ Use existing manifest from workspace | | |
| Manifest file: | Browse. | |
| Seal contents: O Seal the JAR | Details. | |
| Seal some packages Nothing sealed | Details. | |
| Select the class of the application entry point: | | |
| Main class: ce103.JavaSampleLib | Browse. | |
| | | |
| Seck Next > Finish | Cance | el . |

0.173 Shared Library Development - (Eclipse Java Jar Library)-75

In the same export folder now we have JavaSampleLib.jar

Share View ome Q Search java-export-sample java-export-sample G ተ > v sy Photo Print 🔻 📵 Photo Print ^ Date modified Name access 🛓 JavaSampleLib.jar 10/24/2021 2:33 PM top * JavaSampleLibExecutable.bat 10/24/2021 11:33 A nloads * JavaSampleLibExecutable.exe 10/24/2021 11:02 A iments * 🛓 JavaSampleLibExecutable.jar 10/24/2021 10:25 A 🦹 JavaSampleLibExecutable.xml * ires 10/24/2021 11:02 A nple-lib export-sample 0S

0.174 Shared Library Development - (Eclipse Java Jar Library)-76

return back to java-sample-app and then add this jar file to our project

Build Path->Add External Archives



0.175 Shared Library Development - (Eclipse Java Jar Library)-77

you will see its added to reference libraries



0.176 Shared Library Development - (Eclipse Java Jar Library)-78

in our JavaSampleApp.java we can use the following source codes

package ce103;

```
import java.io.IOException;
public class JavaSampleApp {
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        System.out.println("Hello World!");
        JavaSampleLib.sayHelloTo("Computer");
        int result = JavaSampleLib.sum(5, 4);
        System.out.println("Results is" + result);
        System.out.printf("Results is %d \n", result);
        try {
            System.in.read();
        } catch (IOException e) {
            // TODO Auto-generated catch block
            e.printStackTrace();
        }
    }
}
```

0.177 Shared Library Development - (Eclipse Java Jar Library)-79

When we run application we will see similar output



0.178 Shared Library Development - (Eclipse Java Jar Library)-80

Lets export this application with its dependent library







0.180 Shared Library Development - (Eclipse Java Jar Library)-82

Set Launch configuration and Export destination

C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleAppSingle.jar

| 🖨 Runnable JAR File | e Export | | | | \times |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------|---------------------|--------|----------|
| Runnable JAR File Select a 'Java Applic | Specification ation' launch con | figuration to use t | o create a runnable | e JAR. | Q |
| Launch configuration | n: | | | | |
| JavaSampleApp - ja | va-sample-app | | | | ~ |
| Export destination: | | | | | |
| :\Users\ugur.coruh | \Desktop\java-ex | port-sample\Java | SampleApp.jar 🗸 | Brows | se |
| Library handling: C Extract required li Package required Copy required libr | braries into gener libraries into gene raries into a sub-f | rated JAR erated JAR older next to the g | jenerated JAR | | |
| Save as ANT scrip | t | | | | |
| ANT script location: | C:\Users\ugur.co | oruh\eclipse-work | space 🗸 🗸 | Brows | se |
| | | | | | |
| ? | < Back | Next > | Finish | Cano | :el |

0.181 Shared Library Development - (Eclipse Java Jar Library)-83

In this option we will have single jar file

In the export folder we do not see reference libraries



0.182 Shared Library Development - (Eclipse Java Jar Library)-84

only change copy required libraries setting and then give a new name for new jar file and export C:\Users\ugur.coruh\Desktop\java-export-sample\JavaSampleAppMultiple.jar

| 🖨 Runnable JAR File | e Export | | | | | × |
|-----------------------|------------------|--------------------|-----------------------|------------------|-------|--------|
| Runnable JAR File | Specification | on configuratio | | a ruppable IAP | | 7 |
| зејест а зача Арріїс | | configuratio | on to use to create a | a runnable JAR. | | |
| Launch configuration | n: | | | | | |
| JavaSampleApp - jav | va-sample-ap | р | | | | \sim |
| Export destination: | | | | | | |
| C:\Users\ugur.corul | h\Desktop\jav | va-export-sa | mple\JavaSampleA | ppMultiple.jar 🗸 | Brows | e |
| Library handling: | | | | | | |
| O Extract required li | braries into g | enerated JAR | t | | | |
| O Package required | libraries into | generated JA | AR | | | |
| Copy required libr | raries into a si | ub-folder ne | xt to the generated | JAR | | |
| Save as ANT script | t | | | | | |
| ANT script location: | C:\Users\ug | ur.coruh\ecl | ipse-workspace | ~ | Brows | e |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| ٢ | | | N | | - | |
| \mathcal{O} | | < Back | Next > | Finish | Canc | el |
| | | | | | | |

0.183 Shared Library Development - (Eclipse Java Jar Library)-85

now we have a folder that contains our libraries referenced

| | ^ | Name |
|---|---|-----------------------------------------------------------------------------------|
| r | | JavaSampleAppMultiple_lib JavaSampleAppMultiple.jar JavaSampleAppSingle.jar |
| ۴ | | 🕌 JavaSampleLib.jar |

0.184 Shared Library Development - (Eclipse Java Jar Library)-86

in this file we can find our library



0.185 Shared Library Development - (Eclipse Java Jar Library)-87

if we test our application we will see it will work

| C:\Users\ugur.coruh\Desktop\java-export-sample>java -jar JavaSampleAr Hello World! Hello There Results is9 Results is 9 | pMultiple.jar |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 24 | Pictures |
| 25 } | c-sample-lil |

if we delete JavaSampleLib.jar and then try running application we will get error



0.186 Application Testing

- C
- C++
- C#
- Java

0.187 Unit Test Development

Wikipedia Unit Test Library List for Each Language

https://en.wikipedia.org/wiki/List_of_unit_testing_frameworks

0.187.0.1 Visual Studio Community Edition

0.187.0.1.1 C Unit Tests

0.187.0.2 Visual Studio Community Edition - C Unit Tests

- There is no direct C source testing but with additional frameworks. Visual Studio can test C sources.
- You can check the following entry
 - https://stackoverflow.com/questions/65820/unit-testing-c-code
- Recommended framework is Check
 - https://libcheck.github.io/check/web/install.html
 - https://github.com/libcheck/check/releases

0.187.0.3 Visual Studio Community Edition

 $0.187.0.3.1 \quad \mathrm{C++\ Unit\ Tests}$

0.187.0.4 Visual Studio Community Edition - C++ Unit Tests-1

- C/C++ için birim testleri yazma - Visual Studio (Windows) | Microsoft $Docs^{12}$

0.187.0.5 Visual Studio Community Edition - C++ Unit Tests-2

• Use cpp-sample-lib project and add

 $^{12} \rm https://docs.microsoft.com/tr-tr/visualstudio/test/writing-unit-tests-for-c-cpp?view=vs-2019$

| | | | Ŧ | Solution Explorer | ▼ ∏ X <u>P</u> |
|-----------|-----------------------|-------------------|----------|------------------------------------|-----------------------|
| | | | - | 🛨 💿 🖓 🚚 🐻 - 🔁 🖻 👔 | ۶ – أق |
| | | | | Search Solution Explorer (Ctrl+ş) | projects) |
| on begins | and ends t | nere. | | Clean up C# | |
| | | | . | Build Solution | Ctrl+Shift+B |
| | | | | Rebuild Solution | |
| | | | | Clean Solution | |
| | | | | Analyze and Code Cleanup | • |
| | | | | Batch Build | |
| | | | • | Configuration Manager | |
| | | | 1 | Manage NuGet Packages for Solution | |
| | | | - | Restore NuGet Packages | |
| | | | | New Solution Explorer View | |
| | | | Ť | Retarget solution | |
| | | | | Project Dependencies | |
| | | | | Project Build Order | |
| | New Project | | | Add | + |
| | Existing Project | | ¢ | Set Startup Projects | |
| | Existing Web Site | | | License Headers | ۲. |
| *5 | New Item | | | Git | • |
| to | Existing Item | Shift+Alt+A | A | Darte | Ctrl+V |
| * | New Solution Folder | | - X | Rename | E2 |
| | Installation Configur | ation File | | Image Ontimizer | |
| * | New EditorConfig | | | image Optimizer | • |
| | | Search Error List | | Copy Full Path | |
| Proje | ect | File | | Open Folder in File Explorer | |
| | | | >_ | Open in Terminal | |

0.187.0.6 Visual Studio Community Edition - C++ Unit Tests-3

• Select Native Unit Test

| Search for temp | lates (Alt+S) | | ، م | Clear all |
|--------------------------|----------------------------------------------------|---------------------------------|------------------|-------------------------------------------------------------------------|
| C++ | • | All platforms | • | Test • |
| Write C++ | Unit Test Project C++ unit tests usi Windows | ng the native Microsof Test | ft CppUnitTest f | iramework. |
| Google Write C C++ | e Test C++ unit tests usi Windows | ing Google Test. Includ Test | es a copy of th | e Google Test library for use. |
| | | | | Not finding what you're looking for? Install more tools and features |
| | | | | |

0.187.0.7 Visual Studio Community Edition - C++ Unit Tests-4

• Set project path and name

| Con | figure your new project | |
|-------------|---------------------------------------------------------------------------------------|--|
| Native | Unit Test Project C++ Windows Test | |
| Project nan | ne | |
| cpp-samp | ple-test | |
| Location | | |
| E:\UgurC | oruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming I\Lectures\ce1(👻 | |
| | | |
| | | |
| | | |

0.187.0.8 Visual Studio Community Edition - C++ Unit Tests-5

• You will have cpp-sample-test project





• Add library project from references



0.187.0.10 Visual Studio Community Edition - C++ Unit Tests-7

• Add cpp-sample-lib to cpp-sample-test project

Add Reference

| Projects | |
|-----------------|------------------------------------|
| Solution | Name |
| | cpp-sample-app |
| Shared Projects | cpp-sample-lib |
| | |
| | |
| | |
| | |
| | |

 $0.187.0.11 \quad {\rm Visual\ Studio\ Community\ Edition\ -\ C++\ Unit\ Tests-8} \quad {\rm cpp-sample-test.cpp}$

```
#include "pch.h"
#include "CppUnitTest.h"
#include "..\cpp-sample-lib\samplelib.h"
```

using namespace Microsoft::VisualStudio::CppUnitTestFramework;

```
namespace cppsampletest
{
    TEST_CLASS(cppsampletest)
    {
        public:
        TEST_METHOD(TestSumCorrect)
        {
            Assert::AreEqual(9, sum(4, 5));
        }
        TEST_METHOD(TestSumInCorrect)
        {
            Assert::AreEqual(10, sum(4, 5));
        }
    };
}
```

| (| cpp-sample-test.cpp | + × | cpp-samp | le-app.cpp | 5 | amp |
|---|---------------------|---------|---------------------------------------|-------------|--------|--------|
| • | 💁 cpp-sample-test | | | | | |
| | 8 | Ϊ. | { { | ice epps | amp. | IC C |
| | 9 | | TES | T_CLASS | (cp | psa |
| | 10 | | { | | | |
| | 11 | | pub | lic: | | |
| | 12 | | | | | |
| | 13 | | | ⊘ TEST M | 1ETH(| OD(|
| | 14 | | | { | | |
| | 15 | | | As | ser | t:: |
| | 16 | | | } | | |
| | 17 | | | , | | |
| | | | | 8 | | |
| | 18 | Ė. | | TEST_M | 1ETH(| DD(|
| | 19 | | | { | | |
| | 20 | | | As | ser | t:: |
| | 21 | | | } | | |
| | 22 | | }; | | | |
| | 23 | [[: | } | | | |
| | 24 | _ | | | | |
| | | | | | | |
| | 144 % 🔹 🛇 No | issues | found | 4 | | |
| | Test Explorer | | | | | |
| | | 人 2 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 圖・[語 | a a | ם ס |
| | Test | | | Durati | 00 | Trai |
| | A S cpp-sample-tes | st (2) | | 2 | 253 ms | in ch |
| | 4 😣 cppsampletes | st (2) | | 2 | 53 ms | |
| | 🔺 😢 cppsamplet | test (2 |) | 2 | 53 ms | |
| | TestSumC | orrect | t | | < 1 ms | |
| | 😢 TestSumlı | Corre | ect | 2 | 53 ms | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

 $0.187.0.12 \quad {\rm Visual \ Studio \ Community \ Edition \ - \ C++ \ Unit \ Tests-9}$

0.187.0.13 Visual Studio Community Edition

$0.187.0.13.1 \quad C\# \ Unit \ Tests$

- $\bullet \quad \mathrm{MSTest} \, + \, .\mathrm{Net}$
- Fine Code Coverage
- $\bullet \ \ NUnit + . NetCore$

0.187.1 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-1

• Install extension fine code coverage

https://marketplace.visualstudio.com/items?itemName=FortuneNgwenya.FineCodeCoverage

0.187.2 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-2

• Create a .Net Framework Library



- 0.187.3 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-3
 - Set project framework and path

| Configure your new project | |
|---------------------------------------------------|--|
| Class Library (.NET Framework) C# Windows Library | |
| Project name | |
| cs-lib-sample | |
| Location | |
| C:\Users\ugur.coruh\Desktop\cs-lib-sample\ | |
| Solution name (i) | |
| cs-lib-sample | |
| Place solution and project in the same directory | |
| Framework | |
| .NET Framework 3.0 | |
| | |
| | |
| | |

0.187.4 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-4

• Create library functions



0.187.5 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-5

```
using System;
using System.Collections.Generic;
using System.Text;
namespace cs_lib_sample
{
    public class SampleLibClass
    {
        public static string sayHelloTo(string name)
        {
            string result = String.Empty;
            if (!String.IsNullOrEmpty(name))
            {
                result = "Hello " + name;
            }
            else
            {
                result = "Hello There";
            }
            Console.WriteLine(result);
            return result;
        }
        public static int sum(int a, int b)
        {
            int c = 0;
            c = a + b;
            return c;
        }
        public int multiply(int a, int b)
        {
            return a * b;
        }
    }
}
```

0.187.6 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-6

• Right click and then create unit test project

| 0 ref | erences | s Sampleli | hC | 1966 | | |
|-----------|----------------|-------------------|------------|--------------------------------|----------------|--|
| ۲ ا | 110 0140 | Sumprers | | AttackFlow Sanitization | • | |
| 1 | 0 reference | s | | Clean up C# | | |
| | public | static str | P | Quick Actions and Refactorings | Ctrl+. | |
| | { | | X | Rename | Ctrl+R, Ctrl+R | |
| | str | ing result | | Remove and Sort Usings | Ctrl+R, Ctrl+G | |
| | | | \diamond | View Code | F7 | |
| | if | (!String.] | <u>.</u> | Peek Definition | | |
| | { | | • | Go To Definition | | |
| | | result = | | Go To Base | Alt+Home | |
| | } | | | Go To Implementation | | |
| | els | e | | Find All References | | |
| | { | | Ζ | View Call Hierarchy | Ctrl+K, Ctrl+T | |
| | L. | result = | | Create Unit Tests | | |
| found | N • | (| 1 | Open code in ILSpy | | |
| | | | | Breakpoint | • | |
| - 🛛 🔁 O E | Errors 🔒 💧 0 W | /arnings 🚺 0 of | k | Run To Cursor | Ctrl+F10 | |
| tion | | | | Execute in Interactive | | |
| | | | | Sninnet | • | |

0.187.7 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-7

• Press OK

. _ _ .

Create Unit Tests

| Test Framework: | MSTestv2 | Get Additional Extensions |
|-------------------------------|--------------------------------|-----------------------------------------------|
| Test Project: | <new project="" test=""></new> | ~ |
| Name Format for Test Project: | [Project]Tests | |
| Namespace: | [Namespace].Tests | |
| Output File: | <new file="" test=""></new> | Ý |
| Name Format for Test Class: | [Class]Tests | |
| Name Format for Test Method: | [Method]Test | |
| Code for Test Method: | Assert failure | ¥ |
| | [| OK Cancel |

?

 \times

0.187.8 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-8

```
• Enter test code
using Microsoft.VisualStudio.TestTools.UnitTesting;
using cs_lib_sample;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
namespace cs_lib_sample.Tests
{
    [TestClass()]
    public class SampleLibClassTests
    {
        [TestMethod()]
        public void testSayHelloTo()
        {
            Assert.AreEqual("Hello Computer", SampleLibClass.sayHelloTo("Computer"), "Regular say hello
        }
        [TestMethod()]
        public void testSayHelloToWrong()
        {
            Assert.AreEqual("Hello All", SampleLibClass.sayHelloTo("Computer"), "Regular say hello won'
        }
```

```
[TestMethod()]
   public void testSumCorrect()
    {
        Assert.AreEqual(9, SampleLibClass.sum(4, 5), "Regular sum should work");
    }
    [TestMethod()]
   public void testSumWrong()
    {
        Assert.AreEqual(10, SampleLibClass.sum(4, 5), "Regular sum shouldn't work");
   }
    [TestMethod()]
   public void testMultiply()
    {
        SampleLibClass sampleLib = new SampleLibClass();
        Assert.AreEqual(20, sampleLib.multiply(4, 5), "Regular multiplication should work");
    }
}
```

0.187.9 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-9

• Run tests

}



0.187.10 Visual Studio Community Edition (C# Unit Test + MSTestV2+.Net)-10 you will code coverage and entered or passed branches

| | 😑 🛛 public class | SampleLibClass | | | | | | |
|--------------------|---------------------------------|----------------------------------------------|-------------|-------------|---------|-------|-----------------|----------|
| 8 | { 2 references ♀ 1/2 passing | | | | | | | |
| 9 | 🖻 🛛 public st | public static string sayHelloTo(string name) | | | | | | |
| 10 | { | { | | | | | | |
| 11 | strin | string result = String.Empty; | | | | | | |
| 12 | | | | | | | | |
| 13 | E 1† (! | String.lsNullOrEmpty(name)) | | | | | | |
| 14 | { | | | | | | | |
| 15 | | esult = Hello + name; | | | | | | |
| 10 | { also | | | | | | | |
| 1/ | l l | | | | | | | |
| 10 | u r | esult = "Hello There": | | | | | | |
| 20 | | toure here, | | | | | | |
| 21 | | | | | | | | |
| 22 | Conso | <pre>le.WriteLine(result);</pre> | | | | | | |
| 23 | | | | | | | | |
| 24 | retur | n result; | | | | | | |
| 25 | } | | | | | | | |
| 26 | | | | | | | | |
| 144 % - ON | 2 references | 3 1/2 passing | | | | Þ | In: 18 Ch: 14 | SPC CRLE |
| Fine Code Coverage | , isacs round | | | | | , | child child | - 4 × |
| Coverage Sum | nmary Risk Hotspots | Rate & Review Log Issue/Suggesti | on | | | | Buy me | a coffee |
| - Name | | - Covered | - Uncovered | - Coverable | - Total | | | = |
| • Name | | • covered | • Oncovered | • coverable | • Iotai | | • Elle coverage | |
| - cs-lib-sample | 5 | 17 | 3 | 20 | 39 | 85% | | |
| SampleLibClass | | 17 | 3 | 20 | 39 | 85% | | _ |
| an lile annual | eTests | 14 | 2 | 16 | 51 | 87.5% | | |
| = cs-no-sample | | | | | | | | |

0.187.10.1 Visual Studio Community Edition

0.187.10.1.1 C# Unit Test + NUnit + .NETCore

0.187.10.2 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-1

- Use cshar-sample-lib for this example
- Create and add a unit test project to solution

| Search | for templates (Alt+S) P - Clear all |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C# | • Windows • Test • |
| Z Ü | MSTest Test Project A project that contains MSTest unit tests that can run on .NET Core on Windows, Linux and MacOS. C# Linux macOS Windows Test |
| | NUnit Test Project A project that contains NUnit tests that can run on .NET Core on Windows, Linux and MacOS. C# Linux macOS Windows Desktop Test Web |
| | Unit Test Project (.NET Framework) A project that contains MSTest unit tests. C# Windows Test |
| Ľ٦ | xUnit Test Project A project that contains xUnit.net tests that can run on .NET Core on Windows, Linux and MacOS. C# Linux macOS Windows Test |
| Z | Web Driver Test for Edge (.NET Core) A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsof C# Windows Web Test |
| Z | Web Driver Test for Edge (.NET Framework) A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsof C# Windows Web Test |
| ٣Ì | Unit Test App (Universal Windows) A project to create a unit test app for Universal Windows Platform (UWP) apps using MSTest. C# Windows UWP Test |

| 0.187.10.3 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-2 |
|---------------------------------------------------------------------------------------------|
| Configure your new project |
| NUnit Test Project C# Linux macOS Windows Desktop Test Web |
| Project name |
| csharp-sample-lib-test |
| Location |
| E:\UgurCoruh\RTEU\Lectures\2021-2022 Güz CE103 - Algorithms and Programming \Lectures\ce1(|
| |
| |
| |
| |
| 0.187.10.4 Visual Studio Community Edition (C# Unit Tost NUnit NETCore) ? |
| $(C_{\#})$ Unit $(C_{\#})$ Unit $(C_{\#})$ Unit $(C_{\#})$ Unit $(C_{\#})$ Unit $(C_{\#})$ |
| Additional information |
| Additional information |
| |
| NUnit Test Project C# Linux macOS Windows Desktop Test Web |
| |
| Target Framework 🕕 |
| |
| .NET Core 3.1 (Long-term support) |
| .NET Framework 4.0 |
| .NET Framework 4.5 |
| .NET Framework 4.5.1 |
| .NET Framework 4.5.2 |
| .NET Framework 4.6 |
| .NET Framework 4.6.1 |
| .NET Framework 4.6.2 |
| .NET Framework 4.7 |
| .NET Framework 4.7.1 |
| .NET Framework 4.7.2 |
| .NET Framework 4.8 |
| .NET Core 1.0 (Out of support) |
| .NET Core 1.1 (Out of support) |
| .NET Core 2.0 (Out of support) |
| .NET Core 2.1 (Long-term support) |
| .NET Core 2.2 (Out of support) |
| .NET Core 3.0 (Out of support) |
| .NET Core 3.1 (Long-term support) |
| .NET 5.0 (Current) |
| |

0.187.10.5 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-4 Solution 'csharp-sample-lib' (3 of 3 projects) * C# csharp-sample-app Dependencies Properties * C* Program.cs ★ C# csharp-sample-lib ★ ▲ csharp-sample-lib-test Dependencies 4 Frameworks ⊳ Packages 4 coverlet.collector (3.0.2) ⊳ Microsoft.NET.Test.Sdk (16.9.4) NUnit (3.13.1) ⊳ * NUnit3TestAdapter (3.17.0) ⊳ + C# UnitTest1.cs

0.187.10.6 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-5

• Add project reference


| Projects | | | Search (|
|-----------------|----------------------------------------|--------------------------------------------|----------|
| Solution | Name | Path | Name: |
| Shared Projects | csharp-sample-app csharp-sample-lib | E:\UgurCoruh\RTEU\L E:\UgurCoruh\RTEU\L | csharp- |
| COM | | | |
| Browse | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

0.187.10.7 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-6 Reference Manager - csharp-sample-lib-test

0.187.10.8 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-7 SampleLibraryTestClasss in NUnit Project

```
using csharp_sample_lib;
using NUnit.Framework;
namespace csharp_sample_lib_test
{
   public class SampleLibraryTestClass
    {
        sampleLibClass sampleLib;
        [SetUp]
        public void Setup()
        {
            sampleLib = new sampleLibClass();
        }
        [Test]
       public void testSayHelloTo()
        {
            Assert.AreEqual("Hello Computer", sampleLibClass.sayHelloTo("Computer"), "Regular say hello
        }
        [Test]
       public void testSayHelloToWrong()
        {
            Assert.AreEqual("Hello All", sampleLibClass.sayHelloTo("Computer"), "Regular say hello won'
        }
        [Test]
        public void testSumCorrect()
```

```
{
            Assert.AreEqual(9, sampleLibClass.sum(4, 5), "Regular sum should work");
        }
        [Test]
        public void testSumWrong()
        {
            Assert.AreEqual(10, sampleLibClass.sum(4, 5), "Regular sum shouldn't work");
        }
        [Test]
        public void testMultiply()
        {
            Assert.AreEqual(20, sampleLib.multiply(4, 5), "Regular multiplication should work");
        }
    }
}
```

0.187.10.9 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-8

```
• Sample class library
using System;
namespace csharp_sample_lib
{
    public class sampleLibClass
    {
        public static string sayHelloTo(string name)
        ł
            string result = String.Empty;
            if (!String.IsNullOrEmpty(name))
            {
                result = "Hello " + name;
            }
            else
            {
                result = "Hello There";
            }
            Console.WriteLine(result);
            return result;
        }
        public static int sum(int a, int b)
        {
            int c = 0;
            c = a + b;
            return c;
        }
        public int multiply(int a, int b)
        {
            return a * b;
```

} } }

0.187.10.10 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-9

• Open test explorer and run tests

| 🕨 🕨 – 🧭 🔞 🖾 5 ⊘ 3 🔇 2 | 8 • [E @ @ \$ • | |
|----------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Test | Duration Traits | Error Message |
| 🔺 😢 csharp-sample-lib-test (5) | 71 ms | |
| 🔺 🔀 csharp_sample_lib_test (5) | 71 ms | |
| 🔺 😢 SampleLibraryTestClass (5) | 71 ms | |
| testMultiply | 16 ms | |
| 📀 testSayHelloTo | < 1 ms | |
| 😢 testSayHelloToWrong | 53 ms | Regular say hello won't work Expected string length 9 but was 14. Strings differ at index 6. Expected: "Hello All" But was: |
| testSumCorrect | < 1 ms | |
| 😢 testSumWrong | 2 ms | Regular sum shouldn't work Expected: 10 But was: 9 |
| | | |
| | | |

0.187.10.11 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-10

• or you can run from project



0.187.10.12 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-11

- Also we can create unit test from library class,
- Right click the sampleLibClass and select create unit tests but this option do not provide nunit tests.

| | ibClass | | |
|---------------|--------------------------------|----------------|--|
| Class Samp | AttackFlow Sanitization | • | |
| erences 8 1/2 | Clean up C# | | |
| lic static 🢡 | Quick Actions and Refactorings | Ctrl+. | |
| X | Rename | Ctrl+R, Ctrl+R | |
| string re | Remove and Sort Usings | Ctrl+R, Ctrl+G | |
| I | Peek Definition | | |
| if (!Stri 🍹 | Go To Definition | | |
| Į į | Go To Base | Alt+Home | |
| resul | Go To Implementation | | |
| 1 | Find All References | | |
| | View Call Hierarchy | Ctrl+K, Ctrl+T | |
| | Run Test(s) | Ctrl+R, T | |
| 1 | Debug Test(s) | Ctrl+R, Ctrl+T | |
| resul | Create Unit Tests | | |
| } | Open code in ILSpy | | |
| T | Breakpoint | • | |

 $0.187.10.13 \ \ Visual \ \ Studio \ \ Community \ \ Edition \ \ (C\# \ \ Unit \ \ Test+NUnit+.NETCore)-12$

Create Unit Tests

?

 \times

| est Framework: | MSTestv2 | × |
|-------------------------------|--------------------------------|---------------------------|
| | | Get Additional Extensions |
| est Project: | <new project="" test=""></new> | v |
| lame Format for Test Project: | [Project]Tests | |
| lamespace: | [Namespace].Tests | |
| Output File: | <new file="" test=""></new> | v |
| lame Format for Test Class: | [Class]Tests | |
| lame Format for Test Method: | [Method]Test | |
| ode for Test Method: | Assert failure | v |
| | | OK Cancel |

0.187.10.14 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-13



0.187.10.16 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-15

```
using Microsoft.VisualStudio.TestTools.UnitTesting;
using csharp_sample_lib;
using System;
using System.Collections.Generic;
using System.Text;
namespace csharp_sample_lib.Tests
{
    [TestClass()]
    public class sampleLibClassTests
    {
        [TestMethod()]
        public void sayHelloToTest()
        {
            Assert.Fail();
        }
        [TestMethod()]
        public void sumTest()
        {
            Assert.Fail();
        }
        [TestMethod()]
        public void multiplyTest()
        {
            Assert.Fail();
        }
    }
}
```

0.187.10.17 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-16

- We will not commit this changes and continue from nunit test project, the fine code
- Coverage also work for nunit test but not provide inline highlighting
- If we run tests we will have the following outputs

| sampleLibCla | ass.cs 🛥 🗙 SampleLibra | yTestClass.cs Readme.t | ct csharp-sample-lib.csproj csharp-sample-lib-test | csproj | | | | | | - 0 | Solution Explorer |
|----------------------------------------------|---------------------------------------------|--------------------------|---------------------------------------------------------|--------------------|-------------|---------------------|---------|-------|-----------------|---------|---------------------------------------------------------------------------------|
| 💷 csharp-sar | mple-lib | | dg csharp_sample_lib.sampleLibClass | | • © sayH | elloTo(string name) | | | | - + | G D 🔂 🚚 🔞 - 😂 🗗 |
| 1 | l using Sy | stem; | | | | | | | | | Search Solution Explorer (Ctrl+s |
| 2 | 2 | | | | | | | | | - I. | Solution 'csharp-sample-l |
| 3 | 3 ⊟namespac | e csharp_sample_ | lib | | | | | | | - 15 | C csharp-sample-app |
| 4 | 1 { | | | | | | | | | - 10 | ▲ Sharp-sample-lib-test |
| 5 | 8 reter | ences | ibClass | | | | | | | - 11 | Dependencies |
| 6 | | re cruss samprer. | | | | | | | | - 11 | Constant precionary restore March SampleLibrary Te |
| Ŭ | | 3 references 8 1/2 passi | ng | | | | | | | | |
| 7 | 7 🗄 | public static st | ring sayHelloTo(string name) | | | | | | | | |
| 8 | 3 | (| | | | | | | | | |
| 9 | • | string result | <pre>= String.Empty;</pre> | | | | | | | | |
| 10 | 0 | | | | | | | | | - 11 | |
| 11 | L p | if (!String. | [sNullOrEmpty(name)) | | | | | | | | |
| 12 | 2 | { | | | | | | | | | |
| 13 | 3 | result = | "Hello " + name; | | | | | | | | |
| 14 | 1 | } | | | | | | | | | |
| 15 | | else | | | | | | | | | Git Changes Solution Explorer |
| 15 | | { | "Ualla Thoma". | | | | | | | | Dronostion |
| 10 | | resurc = | Hello mere; | | | | | | | | Properties |
| 44% - | No issues found | - J | | | | | | | Ln: 1 Ch: 1 SPC | CRLF | 11 94 P |
| Fine Code Co | overage | | | | | | | | - | - q × | |
| Coverage | Summary Risk Hots | pots | Rate & Review | Log Issue/Suggesti | on | | | | Buy me a coff | fee 🔨 | 1 |
| Collapse all J | Expand all | | | | | | | Filt | ter: | | |
| | | | | + Covered | - Uncovered | - Coverable | + Total | | + Line coverage | | |
| - Name | | | | 17 | 3 | 20 | 37 | 85% | | | |
| Name – csharp | -sample-lib | | | | | | 37 | 85% | | - 11 | |
| Name csharp- sampleLib(| o-sample-lib | | | 17 | 3 | 20 | | | | | |
| - Name - csharp sampleLib0 - csharp | o-sample-lib oClass o-sample-lib-test | | | 17 | 3 2 | 20 | 47 | 88.8% | | | |

0.187.10.18 Visual Studio Community Edition (C# Unit Test+NUnit+.NETCore)-17

| Test Explorer | | | | |
|--------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|
| 🕩 🕨 – 🧭 🗞 🖾 5 ⊘ 3 🚱 2 | 0 - [≣ ∂ ∂ 0 - | | Search Test Explorer (Ctrl+E) | ρ. |
| Test | Duration Traits | Error Message | Group Summary | |
| ▲ 🔇 csharp-sample-lib-test (5) | 197 ms | | csharp-sample-lib-test | |
| ✓ Scharp_sample_lib_test (5) | 197 ms | | Tests in group : 5 | |
| 🔺 🔀 SampleLibraryTestClass (5) | 197 ms | | Total Duration: 197 ms | |
| testMultiply | 54 ms | | Outcomes | |
| 📀 testSayHelloTo | < 1 ms | | 3 Passed | |
| 😣 testSayHelloToWrong | 136 ms | Regular say hello won't work Expected string length 9 but was 14. Strings differ at index 6. Expected: "Hello All" But was: | 2 Failed | |
| testSumCorrect | < 1 ms | | | |
| 😢 testSumWrong | 7 ms | Regular sum shouldn't work Expected: 10 But was: 9 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Fine Code Coverage Error List Output | Find Symbol Results Test Fr | plorer | | |

• Inline code highlight is part of enterprise visual studio edition

- Analyzing code coverage in Visual Studio - DEV Community 13

0.187.10.19 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)

0.187.10.20 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-1

0.187.10.20.1 TL;DR

 $^{^{13} \}rm https://dev.to/rruizdev/analizando-cobertura-del-codigo-en-visual-studio-1p27$

- Additional information you can use OpenCover + Nunit Runner + Report Generator together to setup a code coverage report but it has complex batch running process. After a few try I decided to use fine code coverage but here is the usage not tested well.
- First unit test runner tool doesn't support .Net Core

c# - The NUnit 3 driver encountered an error while executing reflected code (NUnit.Engine.NUnitEngineException) - Stack Overflow¹⁴

- Follow the instructions on the link

 CMD OpenCover · sukhoi1/Useful-Notes Wiki · GitHub¹⁵
- Install OpenCover, ReportGenerator, Nunit,Runners packages then use the package installation folder to get tools that you need

0.187.10.21 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-2

• Here is a sample for open cover, select package and copy path

 $^{^{14} \}rm https://stackoverflow.com/questions/64611083/the-nunit-3-driver-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-code-nunit-encountered-an-error-while-executing-reflected-code-nunit-encountered-an-error-while-executing-code-nu-error-while-executing-c$

¹⁵https://github.com/sukhoi1/Useful-Notes/wiki/CMD-OpenCover

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^{0.187.10.22} Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-3

• Goto path and tools

C:\Users\ugur.coruh\.nuget\packages\opencover\4.7.1221

• You need to setup some batch similar with following

run-test-coverage.bat

```
set pathA=C:\Users\ugur.coruh\.nuget\packages\opencover\4.7.1221\tools
set pathB=C:\Users\ugur.coruh\.nuget\packages\nunit.consolerunner\3.12.0\tools
set pathC=C:\Users\ugur.coruh\.nuget\packages\reportgenerator\4.8.13\tools\netcoreapp3.0
set dllpath=C:\Users\ugur.coruh\Desktop\csharp-sample-lib\csharp-sample-lib-test\bin\Debug\netcoreapp3.
```

```
"%pathA%\OpenCover.Console.exe" ^
-targetargs:"%dllpath%\csharp-sample-lib-test.dll" ^
-filter:"+[csharp-sample-lib*]* -[*test]*" ^
-target:"%pathB%\nunit3-console.exe" ^
-output:"%dllpath%\coverReport.xml" ^
-skipautoprops -register:user && "%pathC%\ReportGenerator.exe" -reports:"%dllpath%\coverReport.xml" -targetarget
```

0.187.10.23 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-4

• but nunit3-console.exe gives error

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0.187.10.24 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-5

- For this compatibility issues I prefer to use fine code coverage extension.
- OpenCover related studies
 - Code coverage of manual or automated tests with OpenCover for . NET applications – Automation Rhapsody 16
 - Code coverage of .NET Core unit tests with OpenCover Automation Rhapsody¹⁷
- Sample OpenCover report
 - Summary Coverage Report¹⁸

0.187.10.25 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-6

0.187.10.26 Download and Setup OpenCover, NUnit Console, Report Generator without Package Manager

• You can also download the tools from github project pages and install on your operating system,

0.187.10.27 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-7

0.187.10.28 OpenCover

• Releases · OpenCover/opencover · GitHub¹⁹

| OpenCover (Release) 4.7.1221 Latest | |
|----------------------------------------------------------------------|----------|
| Merge pull request #1040 from sawilde/big/1029_chocolatey_dependancy | |
| add dependancy to dotnet 4.7.2 to chocolatey packages | |
| ▼ Assets 6 | |
| | 66 Bytes |
| | 66 Bytes |
| | 8.09 MB |
| | 7.76 MB |
| Source code (zip) | |
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| Source code (tar.gz) | |
| Source code (tar.gz) | |

 $^{^{16} {\}rm https://automationrhapsody.com/code-coverage-manual-automated-tests-open cover-net-applications/manual-automated-tests-open cover-net-applications/m$

- $^{17} \rm https://automationrhapsody.com/code-coverage-net-core-unit-tests-open cover/$
- $^{18} \rm https://automationrhapsody.com/examples/OpenCover-report/$
- ¹⁹https://github.com/OpenCover/opencover/releases

| 0.187.10.29 | Visual S | tudio Comn | nunity Edition (O | C# Unit Test+0 | OpenCover + Nu | nit Runne | r + | |
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| 0.187.10.33 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner | | |
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| Mono.Cecil.Pdb.dll | 9/15/202 |
| Mono.Cecil.Rocks.dll | 9/15/202 |
| Newtonsoft.Json.dll | 11/9/201 |
| 🚯 OpenCover.Console.exe | 6/19/202 |
| OpenCover.Console.exe.config | 6/19/202 |
| OpenCover.Console.pdb | 6/19/202 |
| OpenCover.Extensions.dll | 6/19/202 |
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| | System variables | | | | | | |
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| | Variable | Value | | | | | |
| | ОРСН | C:\Program Files (x86)\OpenCover | | | | | |
| | OS | Windows_NT | | | | | |
| | Path | C:\Program Files\Java\jdk-16.0.1\bin;C:\Program Files\Java\jre1.8.0 | | | | | |
| | PATHEXT | .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.PY;.PYW | | | | | |
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 $0.187.10.37 \quad {\rm Visual\ Studio\ Community\ Edition\ (C\#\ Unit\ Test+OpenCover\ +\ Nunit\ Runner\ +\ Runner\ +\ Runner\ +\ Runner\ +\ Runner\ +\ Nunit\ Runner\ +\ 1997

| | Microsoft Windows [Version 10.0.19043.1288] (c) Microsoft Corporation. All rights reserved. |
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|)-16 | Usage: ["]-target: <target application="">["] [["]-targetdir:<target directory="">["]] [["]-searchdirs:<additional directory="" pdb="">[;<additional pdb<br="">[["]-targetargs:<arguments for="" process="" target="" the="">["]]</arguments></additional></additional></target></target> |

Report)

0.187.10.38 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-17

0.187.10.38.1 ReportGenerator

 - Release Report Generator_4.8.13 · danielpalme/Report Generator · GitHub
20

| ReportGenerator_4.8.13 Latest | Compare 🔻 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 💽 github-actions released this 27 days ago 🛛 4 commits to master since this release 💿 v4.8.13 🔶 e552cc6 🥥 | |
| This release requires .NET 4.7 or .NET Core 2.x/3.x/5.x. | |
| Changes: | |
| #441: Added method coverage to reports #445: Added support for better custom logging #450: Conditional file numbers in class report | |
| ▼ Assets ₃ | |
| | 13.2 MB |
| Source code (zip) | |
| Source code (tar.gz) | |
| 0 | |
| | |

| Share | View | | | | | |
|---------------|-----------------------------------------------------|---------------|--|--|--|--|
| 🔒 > This PC | > This PC > Windows (C:) > ReportGenerator_4.8.13 > | | | | | |
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| Report)-18 | | | | | | |

0.187.10.40 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-19

²⁰https://github.com/danielpalme/ReportGenerator/releases/tag/v4.8.13

0.187.10.40.1 NUnit Console

| inunit.org/download/ | | | 中 🏽 🕁 🔝 🚥 | 🖸 💠 🕲 🕈 🕲 🕢 🕻 🔳 🕈 |
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| | 🛓 Downloads | | | |
| | Download Types | | Latest NUnit 3 Releases | |
| | Download Types | | NUnit 3.13.2 | April 27, 2021 |
| | The latest releases of can always be found on the | The latest releases of can always be found on the relevant GitHub releases pares | | January 17, 2021 |
| | | e referant entries refeacee pagee. | NUnit Test Adapter 3.17 | July 11, 2020 |
| | | | NUnit Test Generator 2.3 | September 20, 2019 |
| | | | NUnit 3 Template for dotnet new CLI | |
| | | | Latest NUnit 2 Release | |
| | | | NUnit 2.7.1 | August 19, 2019 |
| | | | NUnit Test Adapter 2.2 | June 5, 2019 |
| | | | | |

These releases are needed by many people for legacy work, so we keep them around for download. Bugs are accepted on older releases only if they can be reproduced on a current release.

 $0.187.10.41 \quad {\rm Visual\ Studio\ Community\ Edition\ (C\#\ Unit\ Test+OpenCover\ +\ Nunit\ Runner\ +\ +\ Runner\ +\ +\ Runner\ +\$

| | ▼ Assets 10 | |
|------------|-------------------------------------|---------|
| | 😚 nunit-console-runner.3.12.0.nupkg | 733 KB |
| | 😚 NUnit.Console-3.12.0.msi | 1.04 MB |
| | 😚 NUnit.Console-3.12.0.zip | 14.4 MB |
| | 😚 NUnit.Console.3.12.0.nupkg | 19.2 KB |
| | 😚 NUnit.ConsoleRunner.3.12.0.nupkg | 746 KB |
| | 😚 NUnit.Engine.3.12.0.nupkg | 1 MB |
| | 😚 NUnit.Engine.Api.3.12.0.nupkg | 42.8 KB |
| | 😚 NUnit.Runners.3.12.0.nupkg | 19.3 KB |
| | Source code (zip) | |
| | Source code (tar.gz) | |
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| Depart) 20 | | |
| neportj-20 | | |

 21 https://nunit.org/download/

0.187.10.42 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner +



0.187.10.43 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-22

• Download setup



0.187.10.44 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-23

• Install setup

Share View > This PC > Windows (C:) > Program Files (x86) > NUnit.org > nunit-console > :o Print 💌 🕲 Photo Print Name Date modified Size Туре addins 10/24/2021 11:30 PM File folder agents 10/24/2021 11:30 PM File folder nunit.bundle.addins 4/2/2018 2:18 PM ADDINS File 1 KB nunit.engine.api.dll 1/23/2021 3:03 PM Application exten... 18 KB XML File inunit.engine.api.xml 1/23/2021 3:03 PM 55 KB nunit.engine.core.dll 1/23/2021 3:03 PM 91 KB Application exten... ple-lib nunit.engine.dll 1/23/2021 3:03 PM Application exten... 54 KB -sample nunit3-console.exe 1/23/2021 3:04 PM Application 163 KB nunit3-console.exe.config 12/27/2020 3:39 PM Configuration Sou... 2 KB testcentric.engine.metadata.dll 9/3/2020 6:49 PM Application exten... 173 KB ersonal

0.187.10.45 Visual Studio Community Edition (C# Unit Test+OpenCover + Nunit Runner + Report)-24

0.187.11 NUnit + MSTest Batch Report Generation (Not Tested)

- OpenCover and ReportGenerator Unit Test Coverage in Visual Studio 2013 and 2015 Code-Helper.Net 22
- OpenCover and ReportGenerator Unit Test Coverage in Visual Studio 2013 and 2015 CodeProject²³

0.187.12 Java Unit Tests

0.187.12.1 Eclipse IDE (JUnit4, JUnit5)

0.187.12.2 Eclipse IDE (JUnit4 , JUnit5) + Java Unit Test In this sample we will create two example for similar library

Please check the following links

JUnit 5 tutorial - Learn how to write unit tests 24

JUnit 5^{25}

JUnit 5 User Guide²⁶

https://www.eclemma.org/

JUnit Hello World Example - Examples Java Code Geeks - 2021²⁷

https://yasin memic.medium.com/java-ile-unit-test-yazmak-birim-test-ca15cf0d024b

0.187.12.3 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test In normal java application we can right click the project java-sample-lib and add Junit case

 $^{^{22} \}rm http://codehelper.net/unit-testing/opencover-and-report generator-unit-test-coverage-in-visual-studio-2013-and-2015/$

²³https://www.codeproject.com/Articles/1276980/OpenCover-and-ReportGenerator-Unit-Test-Coverage-i

 $^{^{24} \}rm https://www.vogella.com/tutorials/JUnit/article.html$

²⁵https://junit.org/junit5/

²⁶https://junit.org/junit5/docs/current/user-guide/

 $^{^{27} \}rm https://examples.javacodegeeks.com/core-java/junit/junit-hello-world-example/$

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| | പ്പ | Export | | | example | Create a JUn | it test case ut .pi |
| | | | | | Other | Ctrl+N | System.out.p |
| | | References | > | | | 32 | 1 |
| | | Declarations | > | | | 33 | try (|
| | | | | | | | |

| | 🛑 New JUnit Te | st Case |
|------------|-----------------------------------|--------------------------------------------------------------------|
| | JUnit Test Case | • |
| | Select the name select methods | of the new JUnit test case. Spec to be tested on the next page. |
| | O New JUnit 3 te | est 🔘 New JUnit 4 test 🔘 Ne |
| | Source folder: | java-sample-lib/src |
| | Package: | ce103 |
| | Name: | JavaSampleLibTest |
| | Superclass | iava lang.Object |
| | Which method s | tubs would you like to create? |
| | | @BeforeEach setUp() |
| | Do you want to a | dd comments? (Configure tem Generate comments |
| | | |
| | Class under test: | ce103.JavaSampleLib |
| | | |
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| | ? | < Back Next |
| 0.187.12.4 | | |

| | Class Under Test |
|---------------|---------------------------------------------|
| | Test stubs will be generated for class: |
| |) JavaSam |
| | i Matching items: |
| | JavaSampleLib - ce103 - java-sample-lib/src |
| | |
| | oce103 - java-sample-lib/src |
| ava Unit Test | ? |
| | |

```
0.187.12.5 \quad \text{Eclipse IDE} \ (\text{JUnit4}\,, \text{JUnit5}) + \text{Java Unit Test}
```



| e New JUnit To | est Case |
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| JUnit 5 | is not on the build path. Do you |
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| Perform the | following action: |
| 🛋 Add JUni | it 5 library to the build path |
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0.187.12.7 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

0.187.12.8 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test and you will have the following test class



0.187.12.9 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test Now we will create tests that check our function flowchart and return values

We need to cover all code branches that we coded

I have updated ${\tt JavaSampleLib.java}$ as follows to check outputs

JavaSampleLib.java

```
package ce103;
public class JavaSampleLib {
   public static String sayHelloTo(String name) {
       String output = "";
        if(!name.isBlank() && !name.isEmpty()){
            output = "Hello "+name;
        }else {
            output = "Hello There";
        }
       System.out.println(output);
       return output;
   }
   public static int sum(int a,int b)
   {
        int c = 0;
        c = a+b;
       return c;
   }
   public int multiply(int a, int b) {
       return a * b;
   }
//
      public static void main(String[] args) {
11
          // TODO Auto-generated method stub
//
          System.out.println("Hello World!");
11
11
          JavaSampleLib.sayHelloTo("Computer");
11
          int result = JavaSampleLib.sum(5, 4);
11
          System.out.println("Results is" + result);
          System.out.printf("Results is %d \n", result);
11
11
11
11
          try {
11
              System.in.read();
11
          } catch (IOException e) {
//
              // TODO Auto-generated catch block
11
              e.printStackTrace();
          }
11
11
11
      }
}
```

0.187.12.10 Eclipse IDE (JUnit4 , JUnit5) + Java Unit Test and JavaSampleLibTest.java

```
package ce103;
import static org.junit.jupiter.api.Assertions.*;
import org.junit.jupiter.api.AfterAll;
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeAll;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.DisplayName;
import org.junit.jupiter.api.RepeatedTest;
import org.junit.jupiter.api.Test;
import org.junit.jupiter.params.ParameterizedTest;
import org.junit.jupiter.params.provider.MethodSource;
class JavaSampleLibTest {
    JavaSampleLib sampleLib;
   @BeforeAll
   static void setUpBeforeClass() throws Exception {
   }
   @AfterAll
   static void tearDownAfterClass() throws Exception {
   }
   @BeforeEach
   void setUp() throws Exception {
        sampleLib = new JavaSampleLib();
   }
   @AfterEach
   void tearDown() throws Exception {
   }
   @Test
   @DisplayName("Simple Say Hello should work")
   void testSayHelloTo() {
        assertEquals("Hello Computer", JavaSampleLib.sayHelloTo("Computer"), "Regular say hello should "
   }
   @Test
   @DisplayName("Simple Say Hello shouldn' work")
   void testSayHelloToWrong() {
        assertEquals("Hello All", JavaSampleLib.sayHelloTo("Computer"), "Regular say hello won't work")
   }
   @Test
   @DisplayName("Simple sum should work")
   void testSumCorrect() {
        assertEquals(9, JavaSampleLib.sum(4, 5), "Regular sum should work");
   }
   @Test
   @DisplayName("Simple sum shouldn't work")
   void testSumWrong() {
```

```
assertEquals(10, JavaSampleLib.sum(4, 5), "Regular sum shouldn't work");
}
@Test
@DisplayName("Simple multiplication should work")
void testMultiply() {
    assertEquals(20, sampleLib.multiply(4, 5), "Regular multiplication should work");
}
@RepeatedTest(5)
@DisplayName("Ensure correct handling of zero")
void testMultiplyWithZero() {
    assertEquals(0, sampleLib.multiply(0, 5), "Multiple with zero should be zero");
    assertEquals(0, sampleLib.multiply(5, 0), "Multiple with zero should be zero");
}
public static int[][] data() {
   return new int[][] { { 1, 2, 2 }, { 5, 3, 15 }, { 121, 4, 484 }, { 2, 2, 2 } };
}
@ParameterizedTest
@MethodSource(value = "data")
void testWithStringParameter(int[] data) {
    JavaSampleLib tester = new JavaSampleLib();
    int m1 = data[0];
   int m2 = data[1];
   int expected = data[2];
   assertEquals(expected, tester.multiply(m1, m2));
}
```

0.187.12.11 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test if we run tests

}

| | | •• | | ~ ~ | | | - | _ | | |
|----------------------------|--------------|----------------------------|-------------------|-----------|--------------------------------------------------------------------------------------------------------------------------|-------------|-------------|----------------|-----------|--------|
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| 🖌 📂 java-sample | e-lib | | | | 2 | | | | | |
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| ✓ (書 src) | | - | | | 4 | import a | na iunit | iuniton | | fton |
| × = ce103 | 2 | | | | 5 | import o | org.junit | .jupiter | .api./ | fton |
| In the | | nolel ib iava | | | 7 | import of | org junit | jupiter | api.P | Reford |
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| > 🕅 Ja. | | New | > | | 9 | import o | org.junit | .jupiter | .api.C | Displa |
| > 🛋 JUnit 5 | | 14600 | · · · · · | | 10 | import o | org.junit | .jupiter | .api.R | Repeat |
| 🔉 🔛 java-sampl | | Open | F3 | | 11 | import o | org.junit | .jupiter | .api.1 | est; |
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| | | Open Type Hierarchy | F4 | | 14 | | | | | |
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| | | | | | 16 | _ | | | | |
| | | Show in Local Terminal | > | | 17 | Java | aSampleLi | b sample | Lib; | |
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| | Ē | Paste | Ctrl+V | | 22 | , | | | | |
| | - | Delete | Delete | | 230 | @Aft | terAll | | | |
| | ~ | Delete | Delete | | 24 | stat | tic void | tearDown | AfterO | lass |
| | | Build Path | > | | 25 | } | | | | |
| | | Sauraa | Alter Chiffer C N | | 26 | | | | | |
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| | | Export | | | 326 | @Aft | terEach | | | |
| | | D.(| | | 33 | void | d tearDow | n() thro | ws Exc | eptic |
| | | References | > | | 34 | } | | | | |
| | | Declarations | > | | 35 | | | | | |
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| | Ś | Refresh | F5 | | 37 | @Dis | splayName | ("Simple | Say H | lello |
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 $0.187.12.12 \quad \text{Eclipse IDE (JUnit4 , JUnit5)} + \text{Java Unit Test} \quad \text{we will see all results there} \\$

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| | lavaSamplel ib | Test (Runner: | JUnit 51 (0. | 120 s) | | | | | |
| | Simple sum | shouldn't we | ork (0.000 s |) | | | | | |
| ~ | testWithStri | ngParameter | (int[]) (0.04 | 9 s) | | | | | |
| | | 2] (0.049 s) | | | | | | | |
| | [2] [5, 3, | 15] (0.003 s) | | | | | | | |
| | a [3] [121, | 4, 484] (0.002 | s) | | | | | | |
| | [4] [2, 2, | 2] (0.005 s) | | | | | | | |
| | Simple sum | should work | : (0.001 s) | | | | | | |
| x | Simple Say | Hello shouldi | n' work (0.0 | 04 s) | | | | | |
| 5 | Simple mul | tiplication sh | ould work | (0.001 s) | | | | | |
| , | Simple Say | Hello should | work (0.00 | 1 s) | | | | | |
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| | 撞 repetitio | n 2 of 5 (0.00 | 1 s) | | | | | | |
| | 撞 repetitio | n 3 of 5 (0.002 | 2 s) | | | | | | |
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| | 撞 repetitio | n 5 of 5 (0.00 | 1 s) | | | | | | |
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| | ure nace | | | | | | | 23 | |

 $0.187.12.13 \quad Eclipse \ IDE \ (JUnit4 \ , \ JUnit5) \ + \ Java \ Unit \ Test \quad also \ we \ can \ see \ the \ code \ coverage \ of \ tests$

| 🦹 Problems @ Javadoc 😣 Declaration 📃 | Console 🔒 | Coverag | e X | | | | |
|-----------------------------------------------|-----------|---------|--------------------|---------------------|--------------------|--|--|
| vaSampleLibTest (1) (Oct 24, 2021 5:07:01 PM) | | | | ~ | | | |
| Element | Coverage | | Covered Instructio | Missed Instructions | Total Instructions | | |
| 🗸 🗁 java-sample-lib | | 92.4 % | 182 | 15 | 197 | | |
| ✓ (₱ src) | | 92.4 % | 182 | 15 | 197 | | |
| 🗸 🌐 ce103 | | 92.4 % | 182 | 15 | 197 | | |
| > 🚺 JavaSampleLibTest.java | | 91.8 % | 145 | 13 | 158 | | |
| ✓ 🚺 JavaSampleLib.java | | 94.9 % | 37 | 2 | 39 | | |
| 🗸 🕝 JavaSampleLib | | 94.9 % | 37 | 2 | 39 | | |
| sayHelloTo(String) | | 91.7 % | 22 | 2 | 24 | | |
| Sum(int, int) | | 100.0 % | 8 | 0 | 8 | | |
| multiply(int, int) | | 100.0 % | 4 | 0 | 4 | | |
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 $0.187.12.14 \quad \text{Eclipse IDE (JUnit4, JUnit5)} + \text{Java Unit Test} \quad \text{when we open our source code (just close and open again another case highlighting will not work) you will see tested part of your codes$



0.187.12.15 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

0.187.12.16 Maven Java Application + JUnit Lets create Maven project with tests

Create a maven project

File -> New -> Maven Project


| type filter text | | | | |
|--------------------------------------------|--------------|--|--|--|
| 😭 Project | ^ | | | |
| 🗸 🗁 Gradle | | | | |
| A Gradle Project | | | | |
| 🗸 🧁 Java | | | | |
| 😤 Java Project | | | | |
| 🐙 Java Project from Existing Ant Buildfile | | | | |
| V 🗁 Maven | | | | |
| 🗐 Check out Maven Projects from SCM | | | | |
| 🗯 Maven Module | | | | |
| 😕 Maven Project | | | | |
| ✓ ➢ Examples | | | | |
| 😭 Editing and validating XML files | \mathbf{v} | | | |
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| C < Back Next > Finish Cancel | | | | |
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| | New Maven Project | | | |
|---------------|----------------------------------------------------|--|--|--|
| | New Maven project | | | |
| | Select project name and location | | | |
| | Create a simple project (skip archetype selection) | | | |
| | Use default Workspace location | | | |
| | Location: | | | |
| | Add project(s) to working set | | | |
| | Working set: | | | |
| | Advanced | | | |
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| \mathbf{st} | | | | |
| | | | | |
| et | Lets convert our sample java-sample- | | | |

 $0.187.12.17 \quad \text{Eclipse IDE} \; (\text{JUnit4} \;, \text{JUnit5}) + \text{Java Unit Test} \\$

0.187.12.18 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test Lets convert our sample java-sample lib directories to standard folder structure for test and app division

Maven – Introduction to the Standard Directory Layout²⁸

Also for intro you can use this

JUnit Hello World Example - Examples Java Code Geeks - 2021²⁹

Eclipse Maven Java JUnit 4.12 (pulled by Maven automatically)

 $^{^{28} \}rm http://maven.apache.org/guides/introduction/introduction-to-the-standard-directory-layout.html \\ ^{20}$

²⁹https://examples.javacodegeeks.com/core-java/junit/junit-hello-world-example/

| 🖨 New Mav | en Project | | | | _ | | × | |
|---------------------------|----------------------------|-----|----------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------|------------|
| New Maven Configure pr | project oject | | | | | N | 1 | |
| Artifact | | | | | | | | |
| Group Id: | com.ce103 | | | | | | ~ | |
| Artifact Id: | java-sample-lib-ext | | | | | | ~ | |
| Version: | 0.0.1-SNAPSHOT | ~ | | | | | | |
| Packaging: | jar | ~ | | | | | | |
| Name: | Java Sample Lib | | | | | | ~ | |
| Description: | Java Sample with Unit Test | | | | | | 0 | |
| Parent Proje | t | | | | | | | |
| Group Id: | | | | | | | ~ | |
| Artifact Id: | | | | | | | ~ | |
| Version: | | ~ | | 1 | Browse | Cle | ar | |
| ? | < <u>B</u> | ack | <u>N</u> ext > | <u>F</u> inish | | Cance | I | |
| | | | | ✓ ﷺ jav. ● ● ● ● ● ● ● ● ● ● ● ● ● ● | a-samp src/ma src/test src/test JRE Sys src target pom.xr | ole-lib in/jav in/res t/java t/resou tem L tem L | -ext a ources urces ibrary | [J2SE-1.5] |
| | | | | M | pom.xr | nl | | |

0.187.12.20 Eclipse IDE (JUnit4 , JUnit5) + Java Unit Test

```
0.187.12.21 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test pom.xml file
```

```
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance
<modelVersion>4.0.0</modelVersion>
<groupId>com.ce103</groupId>
<artifactId>java-sample-lib-ext</artifactId>
<version>0.0.1-SNAPSHOT</version>
<name>Java Sample Lib</name>
<description>Java Sample with Unit Test</description>
</project>
```

```
0.187.12.22 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test we will add JUnit 5 for our project
```

```
<project xmlns="http://maven.apache.org/POM/4.0.0"</pre>
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd"
   <modelVersion>4.0.0</modelVersion>
    <groupId>com.ce103</groupId>
    <artifactId>java-sample-lib-ext</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>Java Sample Lib</name>
    <description>Java Sample with Unit Test</description>
    <dependencies>
        <dependency>
            <proupId>org.junit.jupiter</proupId>
            <artifactId>junit-jupiter-params</artifactId>
            <version>5.7.1</version>
            <scope>test</scope>
        </dependency>
```

```
</dependencies>
```

```
</project>
```





0.187.12.25 Eclipse IDE (JUnit4 , JUnit5) + Java Unit Test Create java sample library in ce103 package, first create java package

| 🖨 New Java Package | 2 | _ | | \times |
|-------------------------|-------------------------------------------------------|---------------|-------|----------|
| Java Package | | | ~ | |
| Create a new Java pa | | | | |
| Creates folders corresp | oonding to packages. | | | |
| Source folder: | java-sample-lib-ext/src/main/java | | Brows | e |
| Name: | ce103 | |] | |
| Create package-info | o.java | | | |
| Generate comm | nents (configure templates and default value <u> </u> | <u>tere</u>) | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| (?) | Finis | h | Cance | 1 |
| | | | | |

 $0.187.12.26 \quad \text{Eclipse IDE (JUnit4 , JUnit5)} + \text{Java Unit Test} \quad \text{In this package create library class}$

| ✓ ₩ java-sample ✓ # src/main/ | -lib-ext ′java | | | |
|----------------------------------|-------------------------------------------|--------------------|----------|-------------------------|
| | New Go Into | > | 12 12 | Java Project Project |
| /── src/ /── src/ → JRE | Open in New Window Open Type Hierarchy | F4 | ₩ © | Package Class |
| ✓ <mark>⊒∖</mark> Mav > a | Show In Show in Local Terminal | Alt+Shift+W > > | C° C° | Interface Enum |
| > 🔤 J > 🚠 ji 🗎 > 🚠 ji 🗎 | Copy Copy Qualified Name | Ctrl+C | 6) © | Record Annotation |

| Create a new Java | class. |
|--------------------|-------------------------------------------------------------------------------|
| Source folder: | java-sample-lib-ext/src/m |
| Package: | ce103 |
| Enclosing type: | |
| Name: | JavaSampleLib |
| Modifiers: | public Opackage |
| | abstract final |
| Superclass: | java.lang.Object |
| Interfaces: | |
| Which method stul | os would you like to create? |
| | public static void main(S |
| | Constructors from super |
| Do you want to add | ✓ Inherited abstract metho I comments? (Configure tem Generate comments |
| | |
| (?) | |

New Java Class

Java Class

 $0.187.12.27 \quad \text{Eclipse IDE} \; (\text{JUnit4}\,, \text{JUnit5}) + \text{Java Unit Test} \\$

0.187.12.28 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test copy content from other library package ce103;

public class JavaSampleLib {

public static String sayHelloTo(String name) {

```
String output = "";
    if(!name.isBlank() && !name.isEmpty()){
        output = "Hello "+name;
    }else {
        output = "Hello There";
    }
   System.out.println(output);
   return output;
}
public static int sum(int a,int b)
{
    int c = 0;
    c = a+b;
   return c;
}
public int multiply(int a, int b) {
   return a * b;
}
```

}

0.187.12.29 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test Now lets create tests inf src/test/java



| Creates fol | ders corresp | onding to packages. |
|-------------|----------------------------|-----------------------------------------|
| Source fold | der: | java-sample-lib- |
| Name: | | ce103 |
| Create p | oackage-info erate comm | . java ents (configure templa |
| | | |
| | | |

 $0.187.12.30\quad \text{Eclipse IDE}\;(\text{JUnit4}\;,\text{JUnit5})+\text{Java Unit Test}$

0.187.12.31 Eclipse IDE (JUnit4 , JUnit5) + Java Unit Test create a JUnit Case

?



New JUnit Test Case

JUnit Test Case

Select the name of the new JUnit test case. Spe select methods to be tested on the next page.

| ○ New JUnit 3 te | st ⊖New JUnit 4 test |
|-----------------------|----------------------------------------------------------------------------------------------------|
| Source folder: | java-sample-lib-ext/src/test/ |
| Package: | ce103 |
| | |
| Name: | JavaSampleLibTest |
| Superclass: | java.lang.Object |
| Which method st | ubs would you like to create? @@BeforeAll setUpBeforeCla @@BeforeEach setUp() constructor |
| Do you want to a | dd comments? (Configure ten Generate comments |
| Class under test | ce103 JavaSamplel ih |
| JUnit 5 require path. | es a Java 8 project. Configure p |
| | |
| ? | < Back Nex |

0.187.12.32 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

| | New JUnit Test Case |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | Test Methods |
| | Select methods for which test method stubs s |
| | Available methods: Image: Second String Second Second Second Second Second Second String Second String Second String Second Second Second String Second Second Second Second Second Second Second String Second String Second String Second String Second Second String Second Second String Second Second String |
| | ? < Back Net |
| 0.187.12.33 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test | |
| | |



0.187.12.34 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

0.187.12.35 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test you will simple template package ce103;

```
import static org.junit.jupiter.api.Assertions.*;
import org.junit.jupiter.api.AfterAll;
import org.junit.jupiter.api.AfterEach;
import org.junit.jupiter.api.BeforeAll;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.Test;
class JavaSampleLibTest {
   @BeforeAll
    static void setUpBeforeClass() throws Exception {
   }
   @AfterAll
   static void tearDownAfterClass() throws Exception {
   }
   @BeforeEach
   void setUp() throws Exception {
   }
   @AfterEach
   void tearDown() throws Exception {
   }
   @Test
   void testSayHelloTo() {
        fail("Not yet implemented");
   }
   @Test
   void testSum() {
        fail("Not yet implemented");
   }
   @Test
   void testMultiply() {
       fail("Not yet implemented");
```

}

}

0.187.12.36 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test now lets copy tests from other projects

Convert source codes to java codes...



0.187.12.37 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

| 🕆 Package Explorer | g u JUnit × |
|-------------------------|---------------------------------------------------|
| Finished after 0.407 se | conds |
| Runs: 14/14 | Errors: 0 |
| | |
| ✓ 🔚 JavaSampleLik | Test [Runner: JUnit 5] (shouldn't work (0.000 |
| ✓ testWithStr | ingParameter(int[]) (0.0 |
| [1] [1, 2, | 2] (0.049 s) |
| 損 [2] [5, 3, | 15] (0.002 s) |
| Jan 121, 🔚 🔚 | 4, 484] (0.001 s) |
| [4] [2, 2, | 2] (0.003 s) |
| 撞 Simple sun | n should work (0.003 s) |
| 💼 Simple Say | Hello shouldn' work (0 |
| 撞 Simple mu | Itiplication should work |
| 🔚 Simple Say | Hello should work (0.0 |
| 🗸 🔚 Ensure corr | ect handling of zero (0 |
| i repetitio | on 1 of 5 (0.002 s) |
| i repetitio | on 2 of 5 (0.001 s) |
| i repetitio | on 3 of 5 (0.001 s) |
| 撞 repetitio | on 4 of 5 (0.002 s) |
| 撞 repetitio | on 5 of 5 (0.002 s) |

 $0.187.12.38 \quad \text{Eclipse IDE} \; (\text{JUnit4}, \text{JUnit5}) + \text{Java Unit Test} \\$



0.187.12.39 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test

0.187.12.40 Eclipse IDE (JUnit4, JUnit5) + Java Unit Test That's a part of java unit testing...

0.188 TDD (Test Driven Development)

- Test Driven Development (TDD)
 - https://en.wikipedia.org/wiki/Test-driven_development
- Acceptance Test Driven Development (ATDD)
 - https://en.wikipedia.org/wiki/Acceptance_test-driven_development
- Also check out
 - https://en.wikipedia.org/wiki/Kent_Beck
- Extreme Programming
 - https://en.wikipedia.org/wiki/Extreme_programming
- Software Design Patterns
 - https://en.wikipedia.org/wiki/Software_design_pattern

0.189 Test and Deployment Automation Management

There are several Continues-Integration services online as follow; - Travis-CI - Appveyor - Jenkins - CircleCI - GitLab - Pantheon - GitHub - Bitrise - Flosum - Buddy - Semaphore

0.190 Test and Deployment Automation Management

- Github provides Github Actions for Releases and Tests
- Jenkins has on promise solutions private development

0.191 Test and Deployment Automation Management

- GitHub Actions provide several actions and market space
 - https://github.com/marketplace/actions/build-c-project
- Also, we Can Provide Our Custom Actions

```
name: hello-world
on: push
jobs:
    my-job:
    runs-on: ubuntu-latest
    steps:
        - name: my-step
        run: echo "Hello World!"
```

0.192 Test and Deployment Automation Management



0.193 Test and Deployment Automation Management

• https://github.com/ucoruh/project-cleaner/blob/main/.github/workflows/dotnet-desktop.yml

This action build c# application and generates setup manually.

- Also there is a nice web example
 - https://dev.to/geromegrignon/github-actions-full-ci-cd-javascript-workflow-39om



1 References

GitHub - MicrosoftDocs/cpp-docs: C++ Documentation 30

End - Of - Week - 4

 $^{^{30} \}rm https://github.com/MicrosoftDocs/cpp-docs$