

CE205 Data Structures Week-1

Introduction to Data Structure

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1 CE205 Data Structures

1.1 Week-1

1.1.0.1 Course Plan and Communication, Course Plan and Communication, Introduction to Linear & Non-Linear Data Structure and Performance Analysis, Implementing Pointer and Objects for Data and Variables Basic of ASN.1 / BER TLV / PER TLV Download PDF¹,DOCX², SLIDE³, PPTX⁴

1.1.1 Outline

- Data States
- Data Structure Metrics
- Data Mapping
- Data Structure Selection
- Data Structure References
- Industrial Data Standards (ASN.1,BER-TLV,etc.)

¹[pandoc_ce205-week-1-intro.tr_doc.pdf](#)

²[pandoc_ce205-week-1-intro.tr_word.docx](#)

³[ce205-week-1-intro.tr_slide.pdf](#)

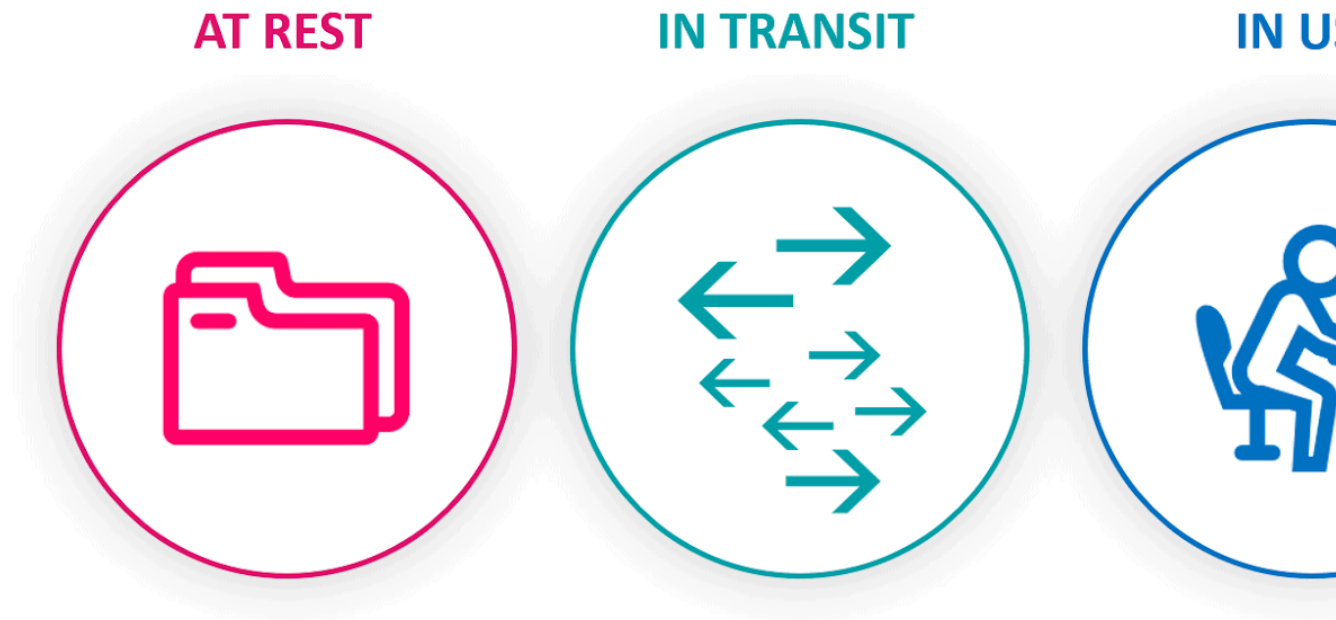
⁴[ce205-week-1-intro.tr_slide.pptx](#)

- Trends (Open API, 5G Systems etc.)

1.2 Introduction to Data Structures

1.2.1 Data States

THE THREE STATES OF DATA



Data-in-use

- Data in use - Wikipedia⁵

Data-in-transit

- Data in transit - Wikipedia⁶

Data-at-rest

- Data at rest - Wikipedia⁷

1.2.2 Data Structure Metrics

Performance Analysis

- Data Structures Tutorials - Performance Analysis with examples⁸

Space Complexity

- Data Structures Tutorials - Space Complexity with examples⁹

Time Complexity

⁵https://en.wikipedia.org/wiki/Data_in_use

⁶https://en.wikipedia.org/wiki/Data_in_transit

⁷https://en.wikipedia.org/wiki/Data_at_rest

⁸http://www.btechsmartclass.com/data_structures/performance-analysis.html

⁹http://www.btechsmartclass.com/data_structures/space-complexity.html

- Data Structures Tutorials - Time Complexity with examples¹⁰

1.2.3 Data Mapping

Data and Variables

- C++ Data Types¹¹

1.2.4 Data Structure Selection

Linear & Non-Linear Data Structures

- Data Structures Tutorials - Linear and Non-linear types¹²
- Data Structure and Types¹³

1.2.5 Data Structure References

Implementing Pointer and Objects

- Check CS50 Pointer Notes¹⁴
- Week 0 - CS50¹⁵

1.2.6 Industrial Data Standards

- ASN.1 / BER TLV / PER TLV
 - <http://lionet.info/asn1c/download.html>
 - GitHub - ucoruh/asn1c-wsl-sample: ASN.1 C WSL and Windows Execution, Debugging and Code Generation Sample¹⁶
 - Open Source ASN.1 Compiler: asn1c 0.9.28¹⁷

1.2.7 Industrial Data Standards - Telco

- Sample Standard for ASN.1 Usage
 - https://www.etsi.org/deliver/etsi_ts/125400_125499/125413/04.09.00_60/ts_125413v040900p.pdf

1.2.8 Industrial Data Standards - Payment

- Payment BER TLV Parser Sample
 - TLV Utilities¹⁸
 - <https://paymentcardtools.com/>

1.2.9 Industrial Data Standards - Telco

1.2.9.1 ASN.1 StandartlarÄ±

- ETSI
 - <https://portal.etsi.org/Services/Centre-for-Testing-Interoperability/ETSI-Approach/Specification-Languages/ASN1>
- ITU-T
 - <https://www.itu.int/ITU-T/recommendations/fl.aspx?lang=1>
- ASN.1 Book
 - <https://www.oss.com/asn1/resources/books-whitepapers-pubs/dubuisson-asn1-book.PDF>

¹⁰http://www.btechsmartclass.com/data_structures/time-complexity.html

¹¹https://www.tutorialspoint.com/cplusplus/cpp_data_types.htm

¹²http://www.btechsmartclass.com/data_structures/linear-non-linear-data-structures.html

¹³<https://www.programiz.com/dsa/data-structure-types>

¹⁴<files/CS50%20Modified.pdf>

¹⁵<https://cs50.harvard.edu/college/2021/fall/weeks/0/>

¹⁶<https://github.com/ucoruh/asn1c-wsl-sample>

¹⁷<http://lionet.info/asn1c/download.html>

¹⁸<https://emvlab.org/tlvutils/?data=6F1A840E315041592E5359532E4444463031A5088801025F2D02656E>

1.2.9.2 Network Measurement Results Data

- NMR
– https://www.etsi.org/deliver/etsi_ts/101500_101599/101503/08.27.00_60/ts_101503v082700p.pdf
- GSM API
– https://www.etsi.org/deliver/etsi_ts/101400_101499/101476/08.04.01_60/ts_101476v080401p.pdf
- UTRAN
– https://www.etsi.org/deliver/etsi_ts/125300_125399/125331/13.01.00_60/ts_125331v130100p.pdf
- E-UTRAN
– https://www.etsi.org/deliver/etsi_ts/136300_136399/136331/15.03.00_60/ts_136331v150300p.pdf

1.2.10 Open Source 5G Projects

- <https://open5gs.org/>
- 5g nr development and setup · Wiki · oai / openairinterface5G · GitLab¹⁹

1.2.11 OPEN API

- Open API Generator
– <https://openapi-generator.tech/>
- Open API Yaml Configurations
– GitHub - jdegre/5GC_APIs: RESTful APIs of main Network Functions in the 3GPP 5G Core Network²⁰
- Open API AUSF Yaml Configuration
– https://www.etsi.org/deliver/etsi_TS/129500_129599/129509/17.06.00_60/ts_129509v170600p.pdf
– https://www.etsi.org/deliver/etsi_TS/129500_129599/129509/17.06.00_60/ts_129509v170600p0.zip

End – Of – Week – 1

¹⁹<https://gitlab.eurecom.fr/oai/openairinterface5g/-/wikis/5g-nr-development-and-setup>

²⁰https://github.com/jdegre/5GC_APIs