CE205 Data Structures Week-1

Introduction to Data Structure

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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 DOC[1], SLIDE[2], PPTX[3]

1.1.1 Outline

- Data States
- Data Structure Metrics
- Data Mapping
- Data Structure Selection
- Data Structure References

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[1] ce205-week-1-intro.md__doc.pdf
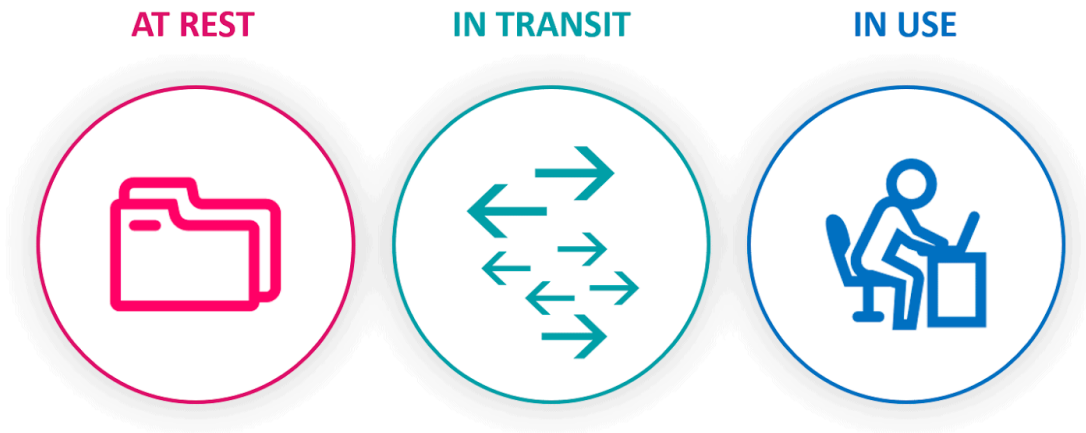[2] ce205-week-1-intro.md__slide.pdf
[3] ce205-week-1-intro.md__slide.pptx

- Industrial Data Standards (ASN.1,BER-TLV,etc.)
- Trends (Open API, 5G Systems etc.)

1.2 Introduction to Data Structures

1.2.1 Data States

THE THREE STATES OF DATA

AT REST   **IN TRANSIT**   **IN USE**

1.2.2 Data States

Data-in-use

- Data in use - Wikipedia[4]

Data-in-transit

- Data in transit - Wikipedia[5]

Data-at-rest

- Data at rest - Wikipedia[6]

1.2.3 Data Structure Metrics

Performance Analysis

- Data Structures Tutorials - Performance Analysis with examples[7]

Space Complexity

- Data Structures Tutorials - Space Complexity with examples[8]

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[4]https://en.wikipedia.org/wiki/Data_in_use
[5]https://en.wikipedia.org/wiki/Data_in_transit
[6]https://en.wikipedia.org/wiki/Data_at_rest
[7]http://www.btechsmartclass.com/data_structures/performance-analysis.html
[8]http://www.btechsmartclass.com/data_structures/space-complexity.html

Time Complexity

- Data Structures Tutorials - Time Complexity with examples[9]

1.2.4 Data Mapping

Data and Variables

- C++ Data Types[10]

1.2.5 Data Structure Selection

Linear & Non-Linear Data Structures

- Data Structures Tutorials - Linear and Non-linear types[11]
- Data Structure and Types[12]

1.2.6 Data Structure References

Implementing Pointer and Objects

- Check CS50 Pointer Notes[13]
- Week 0 - CS50[14]

1.2.7 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 Sample[15]
  - Open Source ASN.1 Compiler: asn1c 0.9.28[16]

1.2.8 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

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1.2.9 Industrial Data Standards - Payment

- Payment BER TLV Parser Sample
  - TLV Utilities[17]
  - https://paymentcardtools.com/

[9]http://www.btechsmartclass.com/data_structures/time-complexity.html
[10]https://www.tutorialspoint.com/cplusplus/cpp_data_types.htm
[11]http://www.btechsmartclass.com/data_structures/linear-non-linear-data-structures.html
[12]https://www.programiz.com/dsa/data-structure-types
[13]files/CS50%20Modified.pdf
[14]https://cs50.harvard.edu/college/2021/fall/weeks/0/
[15]https://github.com/ucoruh/asn1c-wsl-sample
[16]http://lionet.info/asn1c/download.html
[17]https://emvlab.org/tlvutils/?data=6F1A840E315041592E5359532E4444463031A5088801025F2D02656E

1.2.10 Industrial Data Standards - Telco

1.2.10.1 ASN.1 Standartları

- 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

1.2.10.2 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

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1.2.11 Open Source 5G Projects

- https://open5gs.org/

- 5g nr development and setup · Wiki · oai / openairinterface5G · GitLab[18]

1.2.12 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 Network[19]
- 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

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$$End-of-Week-1$$

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[18]https://gitlab.eurecom.fr/oai/openairinterface5g/-/wikis/5g-nr-development-and-setup
[19]https://github.com/jdegre/5GC_APIs