



Managing
Complexity

Vikram
Padman

Agenda

Reading List

Abstraction

Discipline

YYY

PC

Activity

Managing Complexity

CS6133 - Computer Architecture I

Vikram Padman

Polytechnic Institute of New York University

vikram.padman@nyu.edu



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Activity

- 1 **Abstraction**
- 2 **Discipline**
- 3 **The Three -Y's**
- 4 **General Purpose Computing System (PC)**
- 5 **Week 2 Activity 1**



Reading List

Week 2

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








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Activity

- ① “The First Draft Report on the EDVAC”, Chapter 1 and 2
- ② “Digital Design and Computer Architecture”, Chapter 1
- ③ “Computer Organization And Design”, Chapter 1
- ④ “Computer Architecture - A Quantitative Approach”, Chapter 1, section 1.4 and 1.5

- **Abstraction** is a *technique* used to manage complexity by hiding details when they are not relevant.

Application Software		Programs
Operating Systems		Device Drivers
Architecture		Instructions Registers
Micro-architecture		Datapaths Controllers
Logic		Adders Memories
Digital Circuits		AND Gates NOT Gates
Analog Circuits		Amplifiers Filters
Devices		Transistors Diodes
Physics		Electrons



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- Restricting design choices to promote Abstraction and design hierarchy
- **Digital Discipline** : Discrete voltages instead of continuous
 - Simpler to design than analog systems and can be more sophisticated than analog systems
 - Digital systems are replacing analog predecessors: HDTV, cameras, phones, audio players ...etc

- 1 **Hierarchy** : A system divided into modules and sub-modules
- 2 **Modularity** : Having well-defined functions and interfaces
- 3 **Regularity** : Encouraging uniformity, so modules can be easily reused

General Purpose Computing Systems

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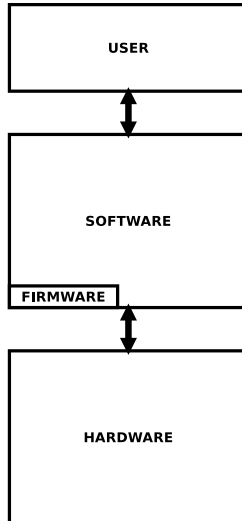
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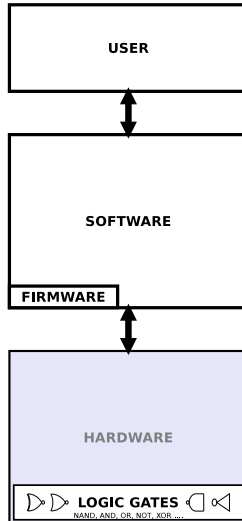
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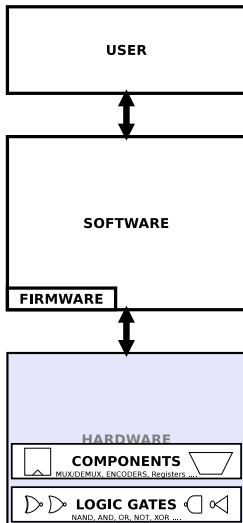
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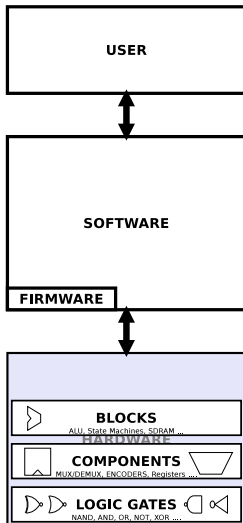
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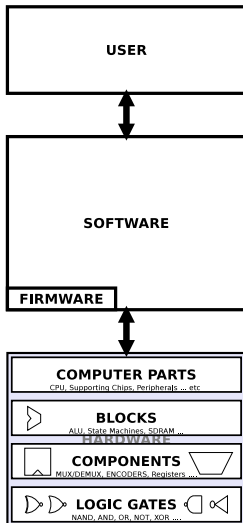
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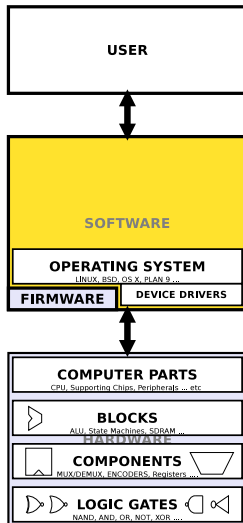
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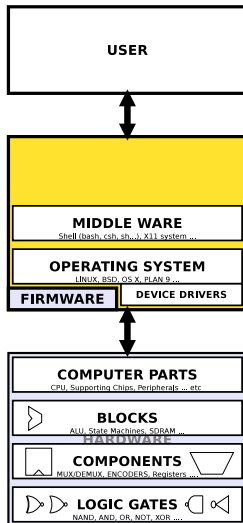
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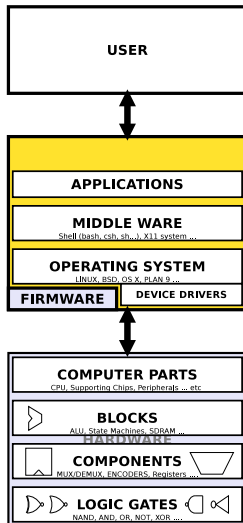
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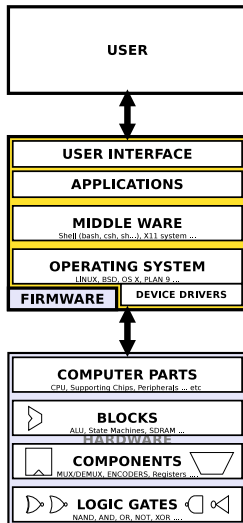
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Activity



Read Chapter 1 and 2 in “The First Draft Report on the EDVAC” by John von Neumann and answer the following questions:

- 1 State and describe in your own words the partitions, modules or subdivisions of a digital computer described by Dr. Neumann.
- 2 In section 2.9 Dr. Neumann compares M, R and he explains why they are needed. Technology has advanced a lot since 1945, do we still need M and R? Justify your answer with details.
- 3 Could modern computers solve mathematical equations using methods other than numerical method? or is it still restricted to numerical methods? Support your answer with details