

### Architecture vs. Organization (continued)

- All Intel x86 family share the same basic architecture
- The IBM System/370 family share the same basic architecture
- Consistent architecture gives code compatibility, at least backwards, thus protecting user's software investment
- Organization differs between different versions

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## In-class Exercise

- Assume you are part of a processor manufacturer's marketing group, and you've been asked to generate specifications for a processor that comes in three versions: economy, mid-range, and high-end.
- In groups of three or four, discuss the differences you would have between the three versions of this processor.

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# Differences in organization but not architecture leads to "families"

- Different cost and performance
- Run same code
- Families may span years of technological advancement

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How do CSCI 2150 and CSCI 2160 relate to CSCI 4717?	
CSCI 2150/2160	CSCI 4717
<ul> <li>Implementation</li> </ul>	<ul> <li>Theoretical</li> </ul>
<ul> <li>Bottom-up design</li> </ul>	•Top-down design
<ul> <li>Problem solving with:</li> </ul>	<ul> <li>Problem solving with:</li> </ul>
-bits	-block diagrams
-bytes	-flow diagrams
-code	-performance
	measures
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# How do CSCI 2150 and CSCI 2160 relate to CSCI 4717? (continued)

- Understanding digital logic:
  - offers ideas as to how architecture is implemented
  - reveals some of the difficulties encountered when trying to realize an architecture.
- Understanding assembly language:
  - helps explain needs of architecture
  - provides foundation for understanding execution of instructions

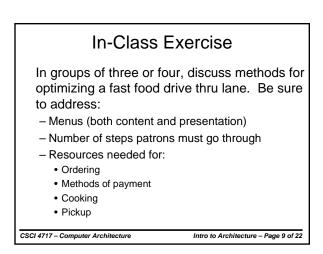
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- provides insight to compiler design

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#### Hierarchical Nature of Complex Systems

- Each level of system hierarchy consists of set of components and their interrelationships
  - Operation of components  $\rightarrow$  Function
  - Interrelation of components  $\rightarrow$  Structure
- Each successively higher layer describes simplified/more abstract view of lower levels

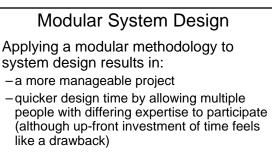
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#### Hierarchical Nature of Complex Systems (continued)

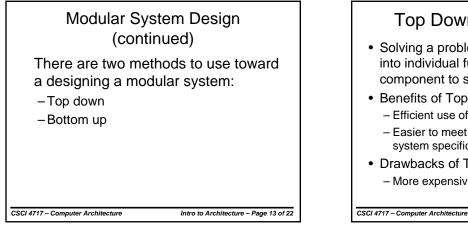
- Breaking system into components or modules forces designer to develop a detailed understanding of the data that is passed between them
- Working within the hierarchy, a designer needs to only concern him/herself with the details of his or her module at that specific level
- Working with a well-defined set of inputs, outputs, and function definition, designers can completely design their module without any knowledge of how rest of system is made

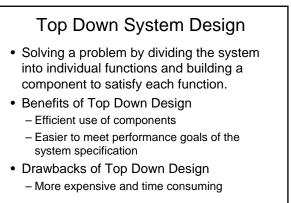
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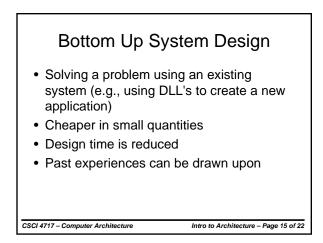


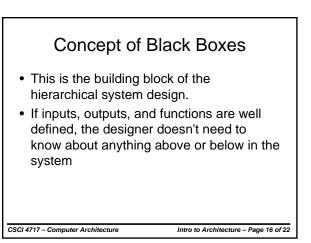
- -a higher quality system
- -a more maintainable system
- -increased module reusability

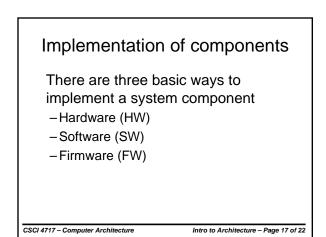


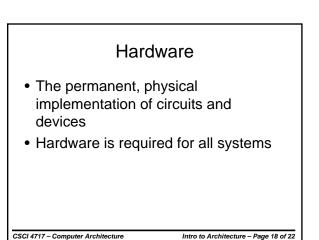


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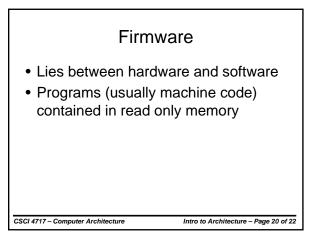






#### Software

- The programs contained in read/write memory ranging from machine language to high-level languages
- Requires a processor to run (hardware dependent)



#### Performance Characteristics

- Throughput/speed HW best; FW average; SW worst
- Development Cost HW best; FW average; SW worst
- Adaptability HW worst; FW average; SW best
- Reliability HW best; FW average; SW average

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