CS286-Computer Organization & Architecture
Possible Quiz Questions (Quiz #4)
on February 11th, 2019

The following is a list of possible questions for our quiz on February 11th. Some of the questions will not be asked in the quiz. All the questions that will appear in the quiz will appear exactly as shown below (however, numeric parameters may be changed). The quiz is closed textbook, closed notes and closed neighbors. Note that the questions, which did not appear in this quiz, still may appear in the exams. You will find a solution for these questions during lectures.

- It is suggested that you bring your calculator (you can use your calculator during the quiz on February 11th).

#1: What is the problem in representing fractions using the “fixed-point” method?

#2: What does “floating point” in “floating point fraction numbers” mean?

#3: What are the three components in the floating-point number expressions?

#4: Show (by an example) how a floating-point number expression can represent a huge number.

#5: Show (by an example) how a floating-point number expression can represent a tiny number.

#6: What is “0.010112” in the decimal format? Show your work.

#7: What is the binary bit pattern of +1210 in the bias of 127? Assume that the bit pattern consists of 8 bits. Show your work.

#8: In IEEE-754 floating-point number standard, how “0” is represented?

#9: In IEEE-754 floating-point number standard, if all the “exponent bits” are “1” (i.e., eight “1”’s), what can it mean?

#10: Translate +262.7510 in the \textit{normalized} \textit{binary} format. Show your work.

#11: What does “normalization” in IEEE-754 standard mean?

#12: What is the advantage of using “normalized” format in IEEE-754 standard?

#13: Show the binary bit pattern for +262.7510 in IEEE-754 format. Show your work.
#14: Show the binary bit patterns for the tiniest positive number in IEEE-754 floating point numbers.

#15: Show the binary bit patterns for the tiniest negative number in IEEE-754 floating point numbers (for the definition of “the tiniest negative”, use the definition in #25).

#16: Show the binary bit patterns for the largest positive number in IEEE-754 floating point numbers (for the definition of “the tiniest positive”, use the definition in #25).

#17: Show the binary bit patterns for the smallest negative number in IEEE-754 floating point numbers (for the definition of “the smallest negative”, use the definition in #26).

**Note:** For questions #15 through #17 above, the following figure will be provided in your quiz question sheet:

#18: What are the five different types of the numbers IEEE-754 floating-point numbers that can not be accurately represented by a processor?

**Note:** This question does not ask descriptions of the five different types of the numbers. Instead, it asks the name of the five different types of the numbers.

#19: What are the five basic steps in a processor datapath?

#20: What does “IF” stage in a processor datapath do?

#21: What does “ID” stage in a processor datapath do?

#22: What does “EX” stage in a processor datapath do?
#23: What does “ME” stage in a processor datapath do?

#24: What does “WB” stage in a processor datapath do?

#25: What is “PC (Program Counter)” register for?

#26: What does “CPI” stand for? What does it mean?

#27: What is “processor clock cycle time”?

#28: Show the formula to calculate the execution time (for scalar processors) using, IC (instruction count), R (clock cycle rate), and one more parameter.

#29: Processors with a lower clock rate execute the same binary programs faster than the processors with a higher clock rate. How is this possible?

#30: For the following performance metrics for processors, show which way each metric is better:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Short</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock rate</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Clock cycle time</td>
<td>short</td>
<td>long</td>
</tr>
<tr>
<td>CPI</td>
<td>small</td>
<td>large</td>
</tr>
<tr>
<td>MIPS rate</td>
<td>small</td>
<td>large</td>
</tr>
</tbody>
</table>

#31: What are “scalar datapath processors”?

#32: What are “pipeline datapath processors”?

#33: What are “super-scalar datapath processors”?

#34: What are “super-pipeline datapath processors”?

#35: What are “VLIW datapath processors”?

#36: What are “vector datapath processors”?

#37: What are “structural hazards”? Show an example of the structural hazard (using assembly instructions).

#38: What are “data hazards”? Show an example of the data hazard (using assembly instructions).

#39: What are “control hazards”? Show an example of the control hazard (using assembly instructions).
#40: What are the four different types of data dependency?

#41: Show an example of RAR data dependency.

#42: Show an example of RAW data dependency.

#43: Show an example of WAR data dependency.

#44: Show an example of WAW data dependency.