Study Guide for Week #5

Note: This is NOT the question list for Quiz #3. Quiz #3 question list will be e-mailed to each of you later.

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

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

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

#4: What does “EX” stage in a processor datapath do?

#5: What does “ME” stage in a processor datapath do?

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

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

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

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

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

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

#12: 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>
#13: What are “scalar datapath processors”?

#14: What are “pipeline datapath processors”?

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

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

#17: What are “VLIW datapath processors”?

#18: What are “vector datapath processors”?

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

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

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

#22: What are the four different types of data dependency?

#23: Show an example of RAR data dependency.

#24: Show an example of RAW data dependency.

#25: Show an example of WAR data dependency.

#26: Show an example of WAW data dependency.