ECE 331 Handout 2: ASM Instruction Execution

68HC12 Programmer’s Model
CPU Registers important to instruction execution

<table>
<thead>
<tr>
<th>Register File</th>
<th>A</th>
<th>7 6 5 4 3 2 1 0</th>
<th>B</th>
<th>7 6 5 4 3 2 1 0</th>
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<tbody>
<tr>
<td>D</td>
<td>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</td>
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<tr>
<td>IX</td>
<td>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</td>
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<tr>
<td>IY</td>
<td>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</td>
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</tbody>
</table>

68HC12 Condition Code Register

| CCR | 7 S X H I N Z V C 0 |

68HC12 Expanded Programmer’s Model

Microcontroller Program Execution: from concept to action

A. Write program to complete task
   - check syntax; test functionality (Simulator)
B. Assemble program (Assembler)
   - ASM code → Machine code (op-codes and operands)
C. Upload program to program memory
D. Run program on Microcontroller
   - set PC to start of program memory
     1. fetch instruction to IR from program memory
     2. decode instruction: set ALU to perform instruction
     3. execute instruction: load/store to data memory
   - advance PC to next instruction in program memory
   - repeat step 1 until commanded to stop
Cycle-by-cycle Instruction Execution Example

Code Executed:
LDAA $3000  (load from $3000)
STAA $2000  (store to $2000)

Legend:
IR = Instruction Register
PC = Program Counter
Date Memory: $2000, $3000
Program Memory: $4000-4005