# ***CSCI.465 (63.465) Operating Systems: Homework #1***

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**Item 2: Simulator Test Program ASSEMBLY with comments**

| **Label** | **Mnemonic** | **Operands** | **Description** |
| --- | --- | --- | --- |
| main | Function |  | Declare the start of the main function. |
|  | Origin | 0 | State where the start of the program is. |
| evensum | Long | 0 | Declare variable evensum and initialize it to 0.  evensum = 0 |
| count | Long | 100 | Declare variable count and initialize it to 100.  count = 100 |
| temp | Long | 0 | Declare variable temp and initialize it to 0.  temp = 0 |
| final | Long | 0 | Declare variable final and initialize it to 0.  final = 0 |
| Loop | Add | evensum,count | Start of the Loop section.  Add count to evensum. That is, evensum =  evensum + count |
|  | Subtract | count,2 | Subtract 2 from count. That is,  count = count – 2 |
|  | BrOnPlus | count,Loop | If count > 0, then jump to the Loop section. Otherwise, proceed. |
| Calc | Move | GPR0,100 | Initialize GPR0 to 100. GPR0 = 100 |
|  | Move | GPR1,5 | Initialize GPR1 to 5. GPR1 = 5 |
|  | Move | temp,550 | Move 550 into temp.  temp = 550 |
|  | Subtract | temp,evensum | Subtract evensum from temp. That is,  temp =  temp – evensum |
|  | Divide | temp,GPR0 | Divide temp by GPR0. That is,  temp = temp / GPR0 |
|  | Multiply | temp,GPR1 | Multiply value of temp and GPR 1. That is,  temp = temp \* GPR1 and  temp = temp \* 5 |
|  | BrOnMinus | temp,Final1 | If temp < 0, then jump to the Final1 section. Otherwise, proceed. |
|  | Move | final,2 | Move 2 into final.  final = 2 |
|  | Halt |  | Issue a CPU halt and stop program execution. |
| Final1 | Move | final,1 | Start of the Final1 section.  Move 1 into final.  final = 1 |
|  | Halt |  | Issue a CPU halt and stop program execution. |
|  | End | Loop | Program execution starts at the start of the Loop section. That is, PC = 4 |

**Item 3: Simulator Test Program (machine code) with comments**

| **Address** | **Content** | **Comment** |
| --- | --- | --- |
| 0 | 0 | evensum Long 0 |
| 1 | 100 | count Long 100 |
| 2 | 0 | temp Long 0 |
| 3 | 0 | final Long 0 |
| 4 | 15050 | Loop start; Add evensum,count;  evensum = evensum + count |
| 5 | 0 | Address of evensum |
| 6 | 1 | Address of count |
| 7 | 25060 | Subtract count,2;  count = count – 2 |
| 8 | 1 | Address of count |
| 9 | 2 | Immediate value of op2 |
| 10 | 85000 | BrOnPlus count,Loop; If the value of count is above 0, jump to the Loop start. Otherwise, proceed. |
| 11 | 1 | Address of count |
| 12 | 4 | Address of Loop start to jump to |
| 13 | 51060 | Move GPR0,100; move the constant 100 into GPR 0. |
| 14 | 100 | Immediate value of op2 |
| 15 | 51160 | Move GPR1,5; move the constant 5 into GPR 1. |
| 16 | 5 | Immediate value of op2 |
| 17 | 55060 | Move temp,550; move the constant 550 into the location of temp; set temp to 550. |
| 18 | 2 | Address of temp |
| 19 | 550 | Immediate value of op2 |
| 20 | 25050 | Subtract temp,evensum;  temp -= evensum; Subtract evensum from temp and store the result in temp. |
| 21 | 2 | Address of temp |
| 22 | 0 | Address of evensum |
| 23 | 45010 | Divide temp,GPR0;  temp /= GPR0; divide temp by the value of GPR 0 and store the result in temp. |
| 24 | 2 | Address of temp |
| 25 | 35011 | Multiply temp,GPR1; multiply the values of temp and GPR 1 and store the result in temp;  temp = temp \* 5 |
| 26 | 2 | Address of temp |
| 27 | 75000 | BrOnMinus temp,Final1; if the value of temp is below 0, jump to Final1 section. Otherwise, proceed. |
| 28 | 2 | Address of temp |
| 29 | 34 | Address of Final1 section start to jump to |
| 30 | 55060 | Move final,2; move the constant 2 into final;  final = 2. |
| 31 | 3 | Address of final |
| 32 | 2 | Immediate value of op2 |
| 33 | 0 | Halt |
| 34 | 55060 | Final1 start.  Move final,1; move the constant 1 into final;  final = 1. |
| 35 | 3 | Address of final |
| 36 | 1 | Immediate value of op2 |
| 37 | 0 | Halt |
| -1 | 4 | End Loop; set the PC to the start of the Loop section;  PC = 4 |

**Item 4: Symbol table**

| **Symbol** | **Value (Address)** |
| --- | --- |
| main | 0 |
| evensum | 0 |
| count | 1 |
| temp | 2 |
| final | 3 |
| Loop | 4 |
| Calc | 13 |
| Final1 | 34 |