Computer Systems and Networks

ECPE 170 – Jeff Shafer – University of the Pacific

Quiz 3

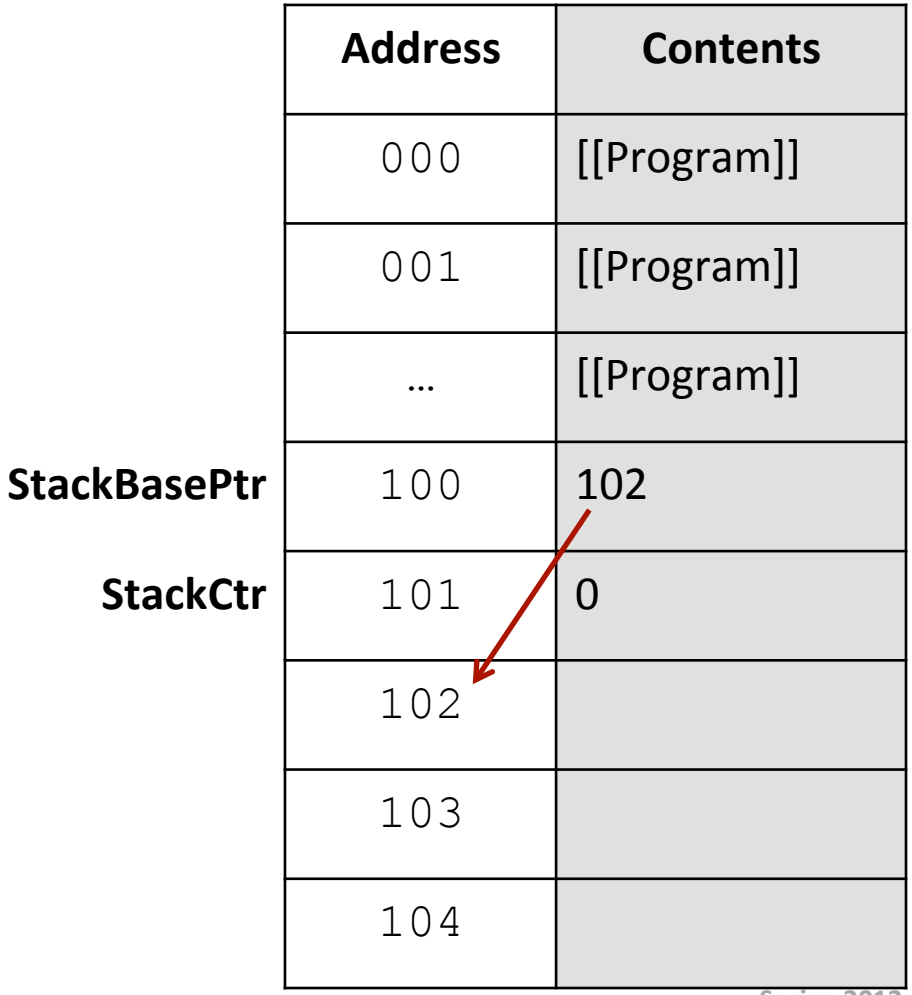
Quiz 3 – MARIE Stack

Simple Stack

- Operations:
  - **PUSH** – place item onto "top" of stack
  - **PEEK** – print (output) item on top of stack
  - **POP** – remove item from top of stack
- Two key stack variables (in *our* implementation)
  - StackBasePtr – Pointer to base of stack
  - StackCtr – Count of current number of elements in stack

Simple Stack

- Start of program
  - Nothing on the stack!
  - Base pointer points to base of stack
  - Counter is 0



Simple Stack

- **Push [55]** operation
- Results after push
  - Counter is now 1
  - Stack element 0 created
- Where does the element go?
  - Mem[102+0]

Value of counter before incrementing!

	Address	Contents
	000	[[Program]]
	001	[[Program]]
	…	[[Program]]
StackBasePtr	100	102
StackCtr	101	1
Stack[0]	102	55
	103	
	104	

Simple Stack

- **Push [66]** operation
- Results after push
  - Counter is now 2
  - Stack element 1 created
- Where does the element go?
  - Mem[102+1]

Value of counter before incrementing!

	Address	Contents
	000	[[Program]]
	001	[[Program]]
	…	[[Program]]
StackBasePtr	100	102
StackCtr	101	2
Stack[0]	102	55
Stack[1]	103	66
	104	

Simple Stack

- **Peek** operation
- Results after peek
  - Counter is unchanged
  - Stack is unchanged
- Element 66 is available
- Where did we find 66?
  - Mem[102+(2-1)]

Value of counter

	Address	Contents
	000	[[Program]]
	001	[[Program]]
	…	[[Program]]
StackBasePtr	100	102
StackCtr	101	2
Stack[0]	102	55
Stack[1]	103	66
	104	

Simple Stack

- **Pop** operation
- Results after pop
  - Counter is now 1
  - Stack is unchanged
- **Don't need to modify the stack in memory**
  - 66 can persist as garbage value beyond current top of stack