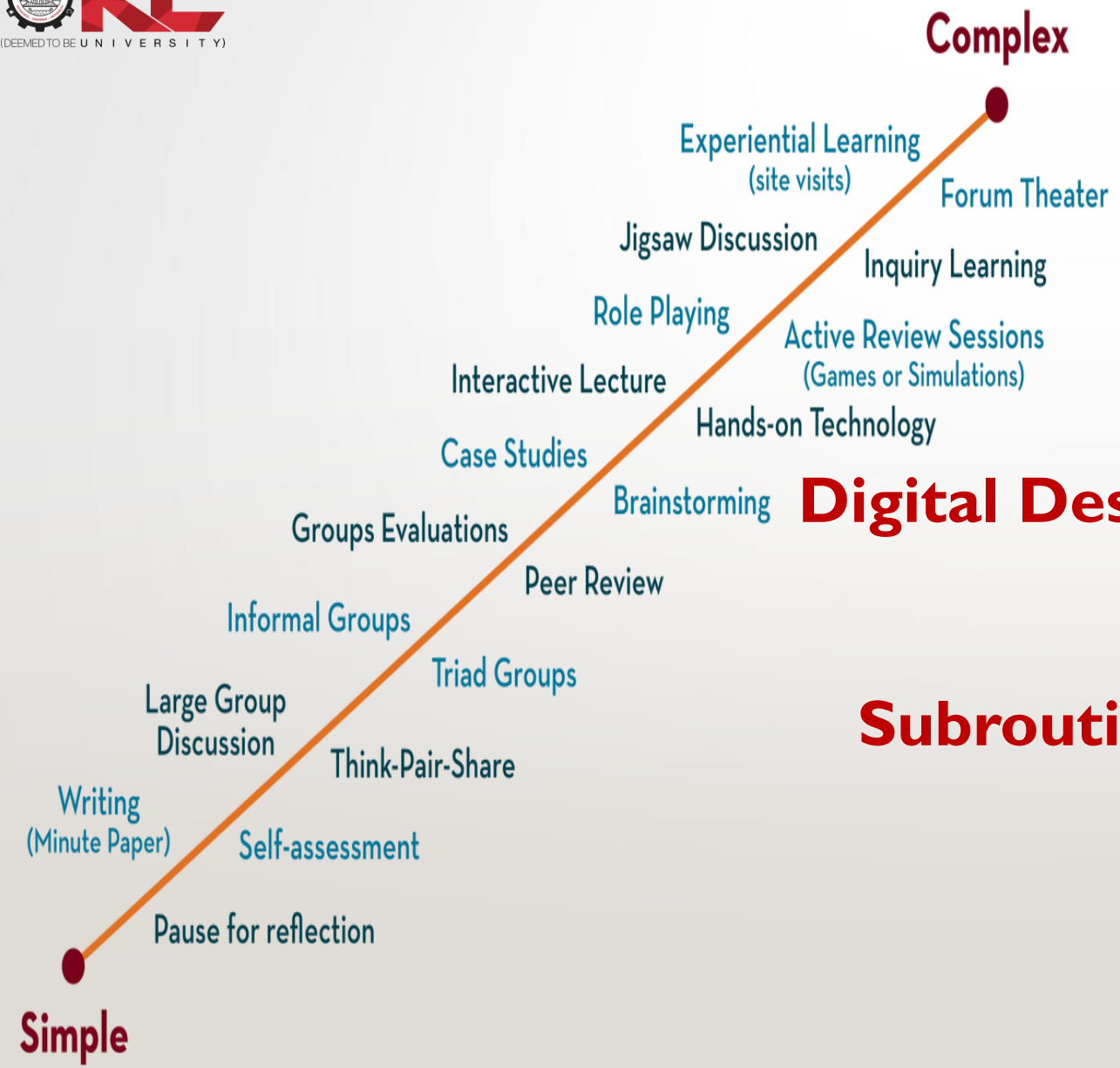


Department of BES-II

Digital Design and Computer Architecture

23EC1202

Topic:

Subroutine Call & Return Mechanism's

Session No: 25

(DEEMED TO BE UNIVERSITY)

AIM OF THE SESSION

To familiarize students with the basic concept of Subroutine call and Return mechanism statements

INSTRUCTIONAL OBJECTIVES

This Session is designed to:

1. Demonstrate the subroutine call and return statements
2. Describe the subroutine call and returns statements with examples and applications
3. List out the applications of subroutine and returns statements with live examples
4. Describe and explain the subroutine call and return statements

LEARNING OUTCOMES

At the end of this session, you should be able to:

1. Define subroutine call and returns statements
2. Describe the applications of procedures with returns statements
3. Summarize the concepts of subroutine call and return statements

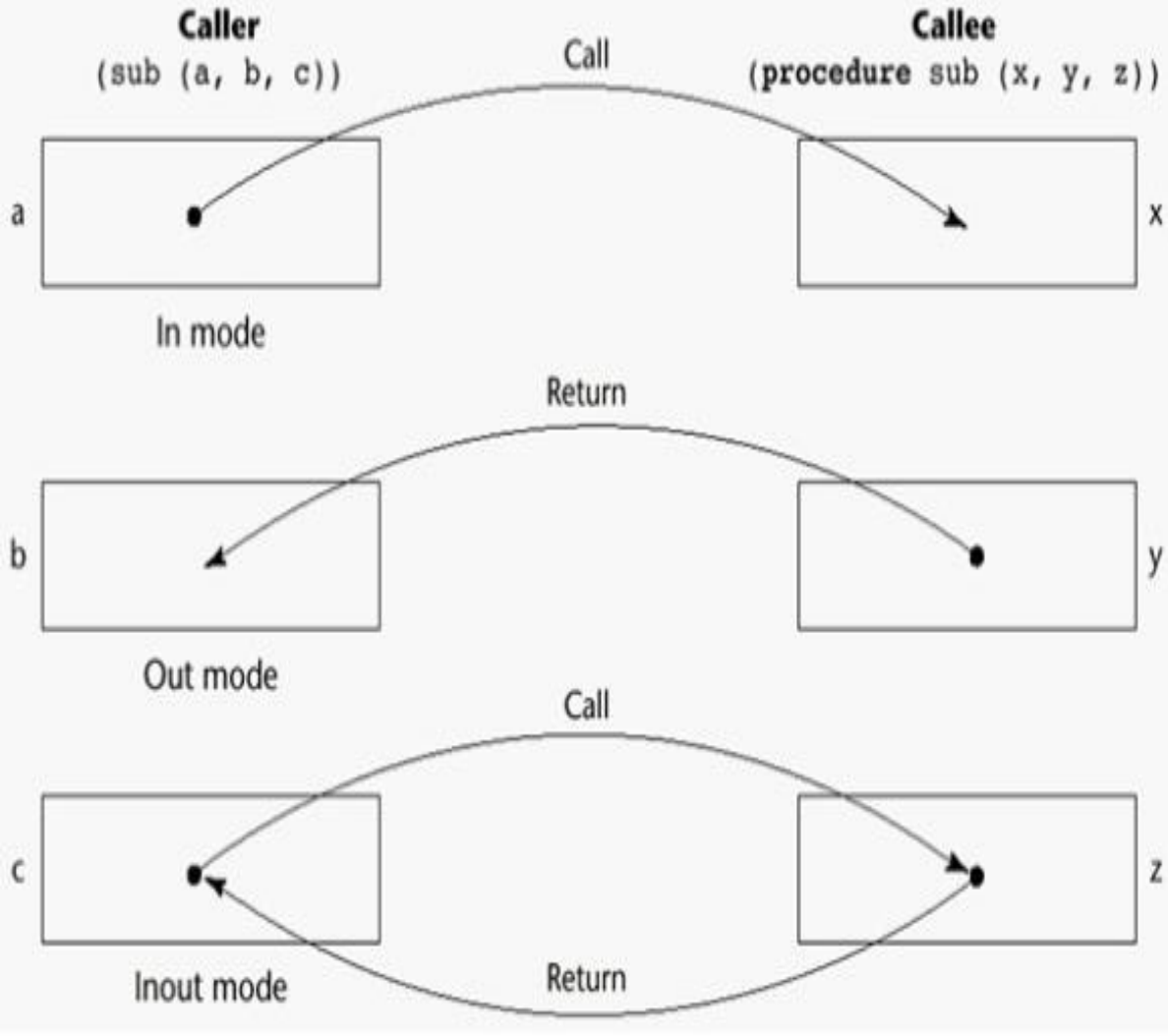
Subroutine call and returns mechanism

- A **routine** or **subroutine**, also referred to as a **function**, **procedure**, and **subprogram**, is a portion of code that may be called and executed anywhere and anytime in a program.

- Subroutines are reusable blocks of code that perform a specific task, and they are called by a main program or other subroutines to accomplish particular functionalities.

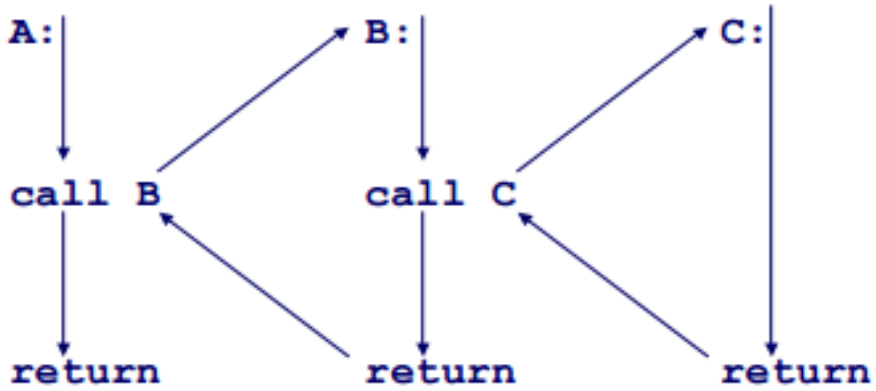
- In different programming languages, a subroutine may be called a **procedure**, a **function**, a **routine**, a method, or a **subprogram**. The generic term **callable unit** is sometimes used

Subroutine, Subroutine call & Nested Subroutine



Nested Subroutine Calls

- A calls B, which calls C

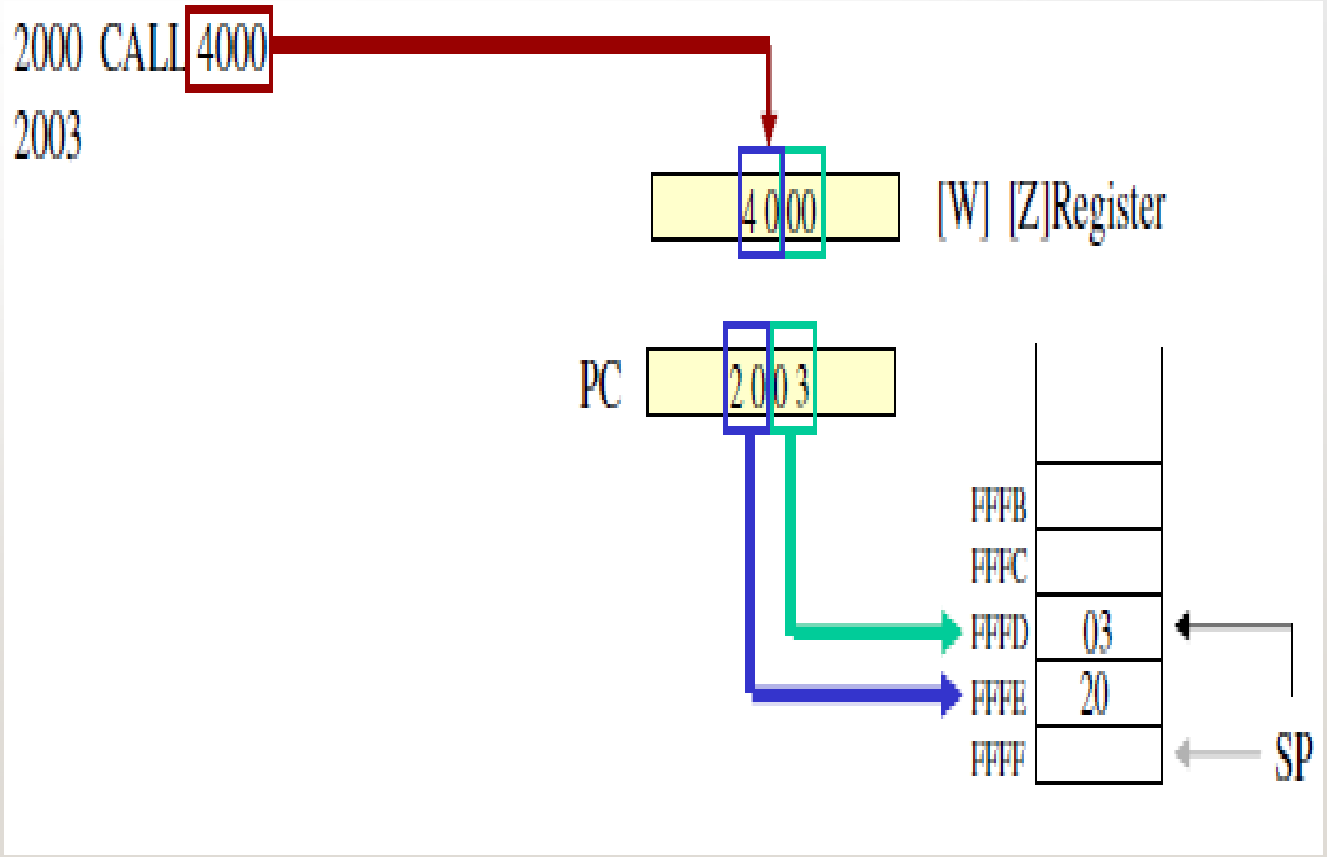


Must even work when B is A

Call instruction

CALL 4000H (3 byte instruction)

- When CALL instruction is fetched, the MP knows that the next two Memory location contains 16bit subroutine address in the memory.

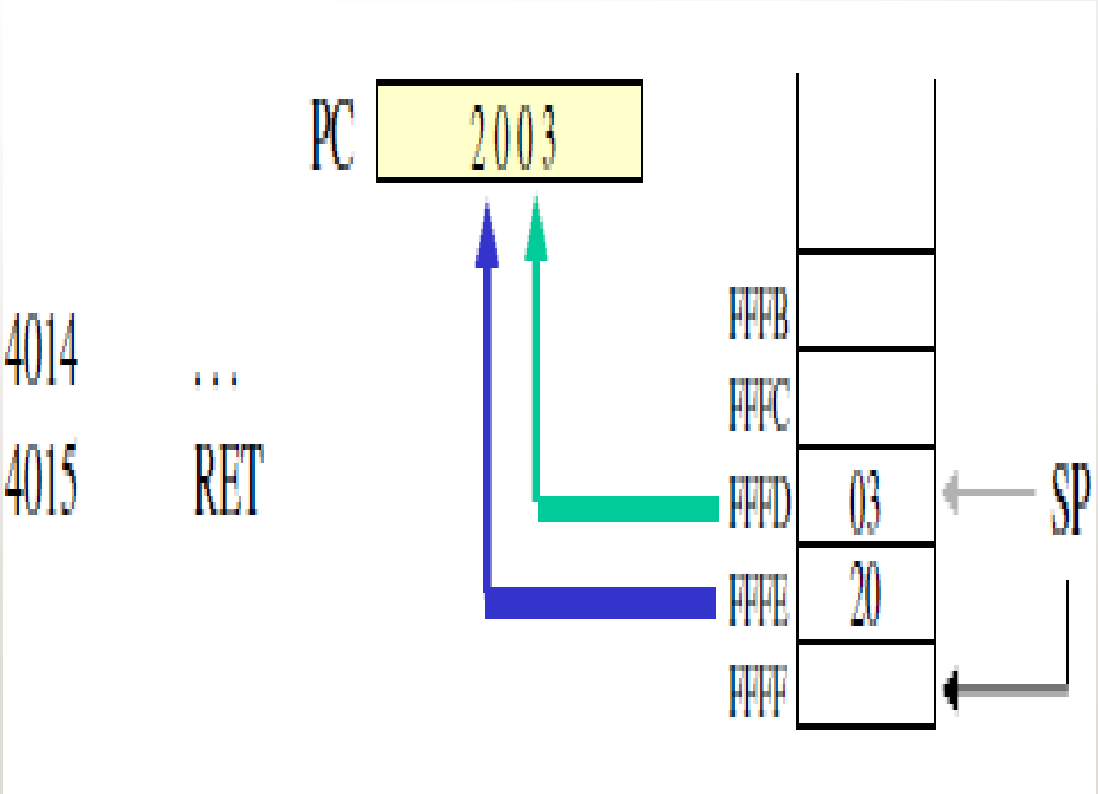


Return instruction

- RET (1 byte instruction)

  - Retrieve the return address from the top of the stack

  - Load the program counter with the return address.



SELF-ASSESSMENT QUESTIONS

1. What is a subroutine in computer programming?

A. A unique type of variable that stores data
B. A set of instructions that perform a particular task, used to structure programs
C. A data structure used to organize data
D. An error or bug in a program

2. When a subroutine is called, the address of the instruction following the CALL instructions stored in/on the _____

(a) Stack
(b) Accumulator
(c) Stack Pointer
(d) Program Counter

TERMINAL QUESTIONS

Short answer questions:

1. Specify the purpose of subroutine call in computer programming.

Long answer questions:

1. Draw the subroutine call and return mechanism in computer programming.

REFERENCES FOR FURTHER LEARNING OF THE SESSION

Reference Books:

1. Computer Organization by Carl Hamacher, Zvonko Vranesic and Saftwat Zaky.
2. Computer System Architecture by M. Morris Mano
3. Computer Organization and Architecture by William Stallings

Sites and Web links:

1. https://www.geeksforgeeks.org/subroutine-subroutine-nesting-and-stack-memory/
2. https://www.tutorialspoint.com/what-are-subroutines

THANK YOU

(DEEMED TO BE UNIVERSITY)

Team – Digital Design & Computer Architecture