Programming Foundation With Pseudocode

Lesson 1: Introduction to Program development with pseudocode

Lesson Objectives

- To Understand the following concepts
  - Introduction to programs
  - Types of projects
  - SDLC process of waterfall model
  - Introduction to Pseudocode
  - Usage of variables and operators
  - Introduction to control constructs

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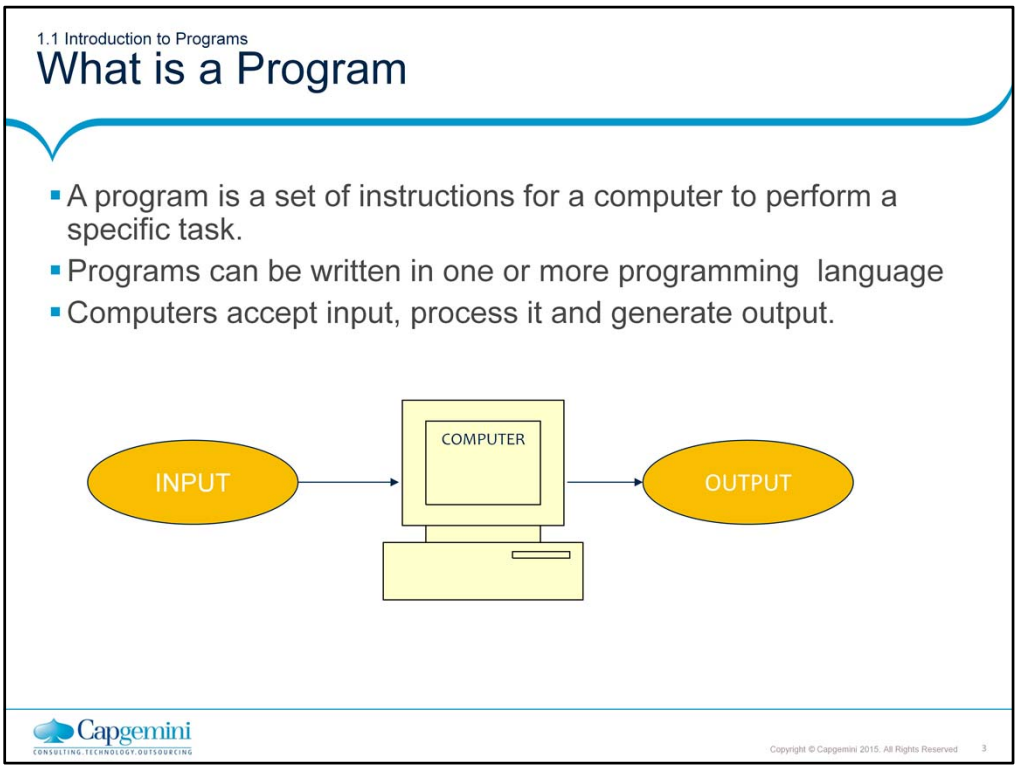


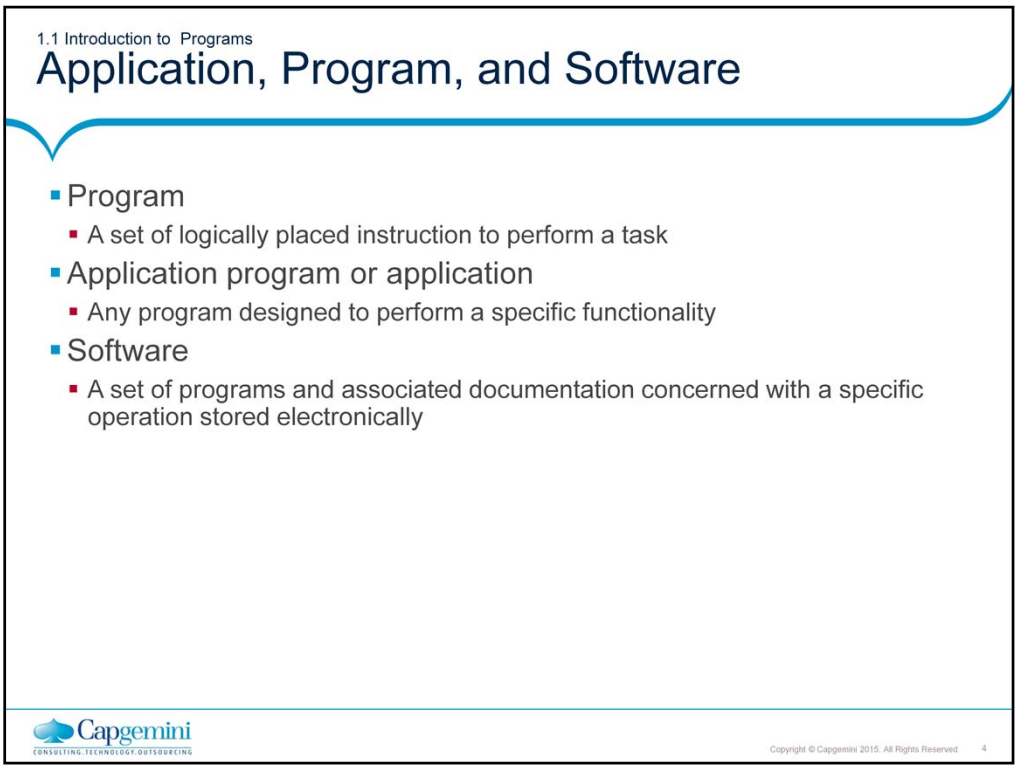
What is a Program?

Set of instructions for a computer to perform a specific task.
Programs can be written in one or more programming language.

Example: Program to receive employee details as an input, then calculate and display the gross and net salary of an employee.

What is Programming Language?

- Used to feed instructions to the computer
- Can be categorized as Machine language, Assembly language, Compiled Languages, Interpreted Languages, Object Oriented Languages … etc
- Languages which are more simpler, easier are referred as High-Level Languages
- Low level languages provides little or no abstraction to the internal working of microprocessor



Program:

Set of ordered instructions that enable a computer to carry out a specific task. A collection of instructions that tell the computer what to do.

Ex: Program to find a prime number, Program to print employee pay slip etc..

Application :

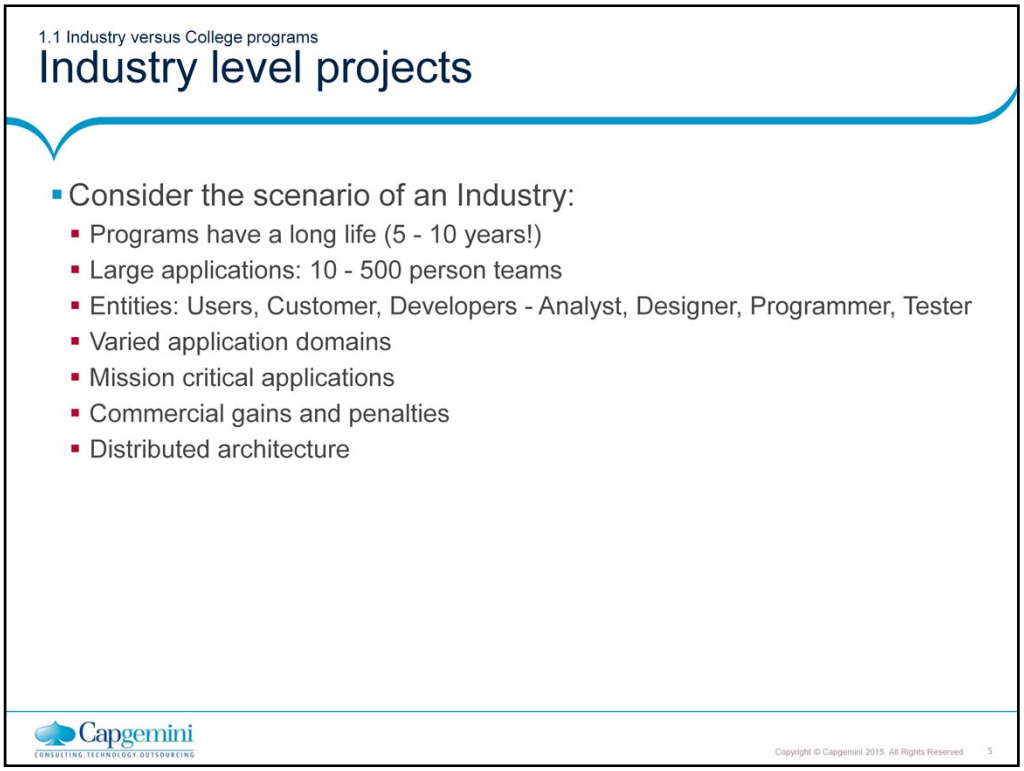
Any program designed to perform a specific function

Ex : Notepad, M S Paint etc

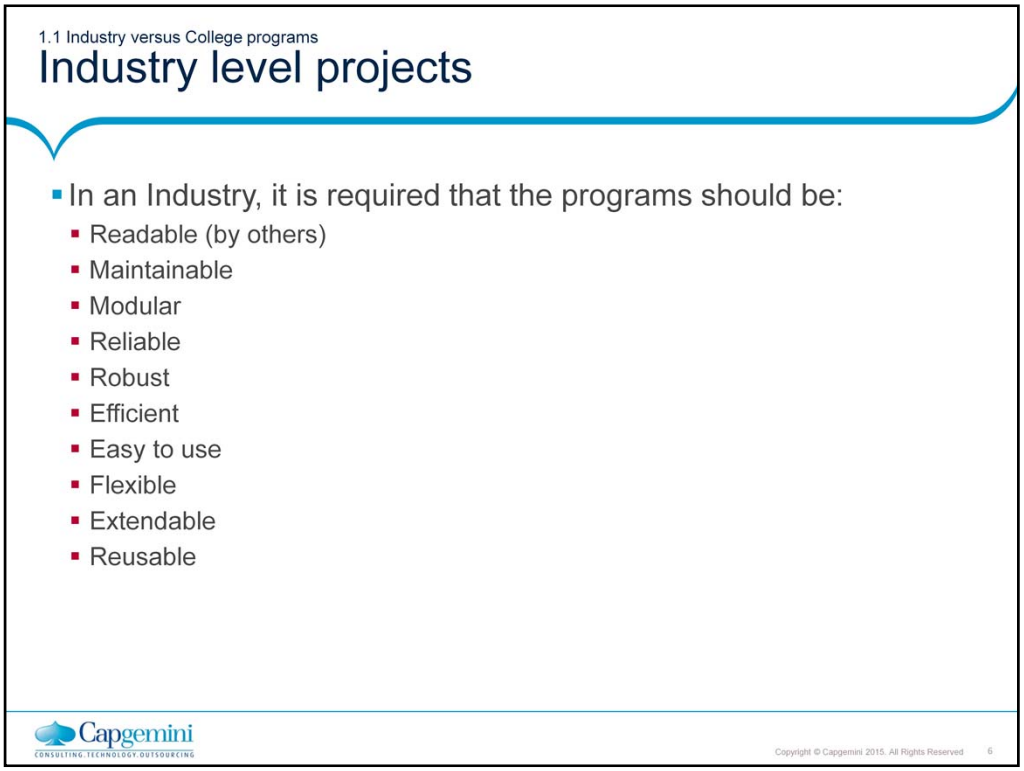
Software:

A set of programs and associated documentation concerned with a specific operation stored electronically

Ex : Microsoft Office, Oracle etc

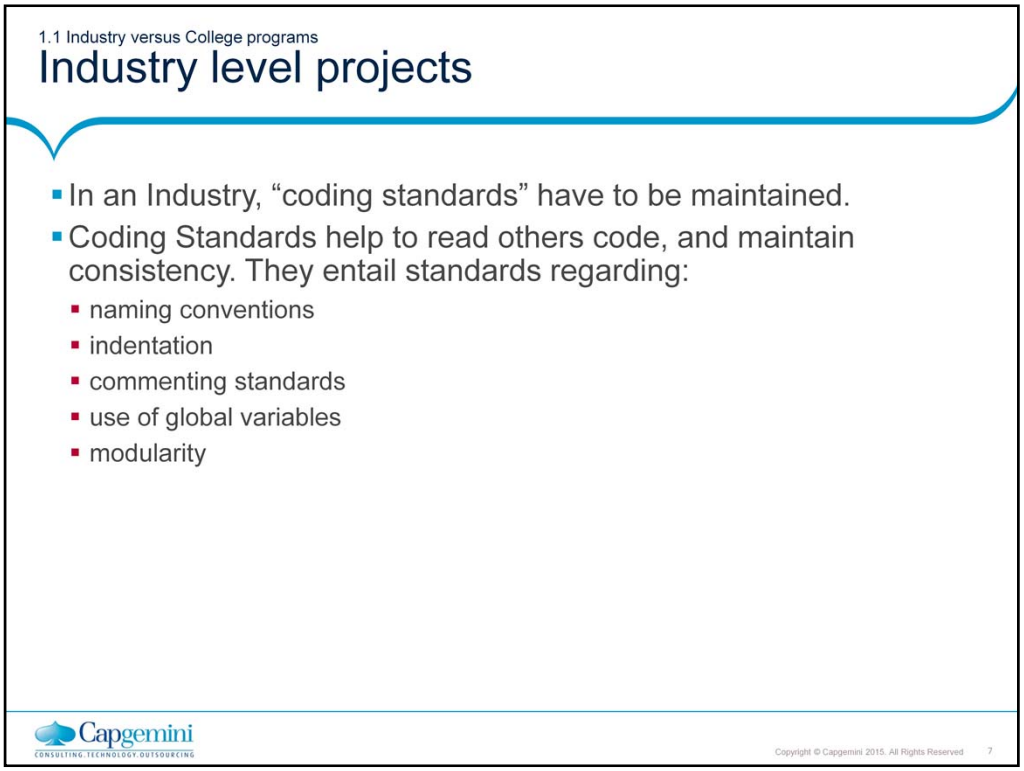


- Consider the scenario of a College:
    - Throw away programs
        - These programs are not used by any one later
    - Same Users / Developers
    - Small assignments: 1-2 person teams
    - No commercial angle
    - Familiar application domain
    - Low criticality
    - Traditional single-machine architecture



Industry level programs should be

- Readable : Easy to read and understand the code at any time since lifetime of projects will be longer in terms of years.
- Maintainable : If the program is easy to understand and If it is easy to modify then the program is called as maintainable
- Modular : A small unit of code for a single purpose
- Reliable : Reliability describes about the ability of a system will work perfectly as stated without failure or error
- Robust : The ability of a system to continue operating despite abnormalities in input, calculations, etc.
- Efficient : A task which gets done in the specified time with desired quality
- Easy to use: Program which is easy to use by the end users
- Flexible
- Extendable : If the additional features of a program is possible to be included without any side effects, then the program is called as extendable.
- Reusable : If the task written in program is called multiple times, then the program is reusable.


1.1 Industry versus College programs
Industry level projects
In an Industry, “coding standards” have to be maintained.
Coding Standards help to read others code, and maintain consistency. They entail standards regarding:
naming conventions
indentation
commenting standards
use of global variables
modularity
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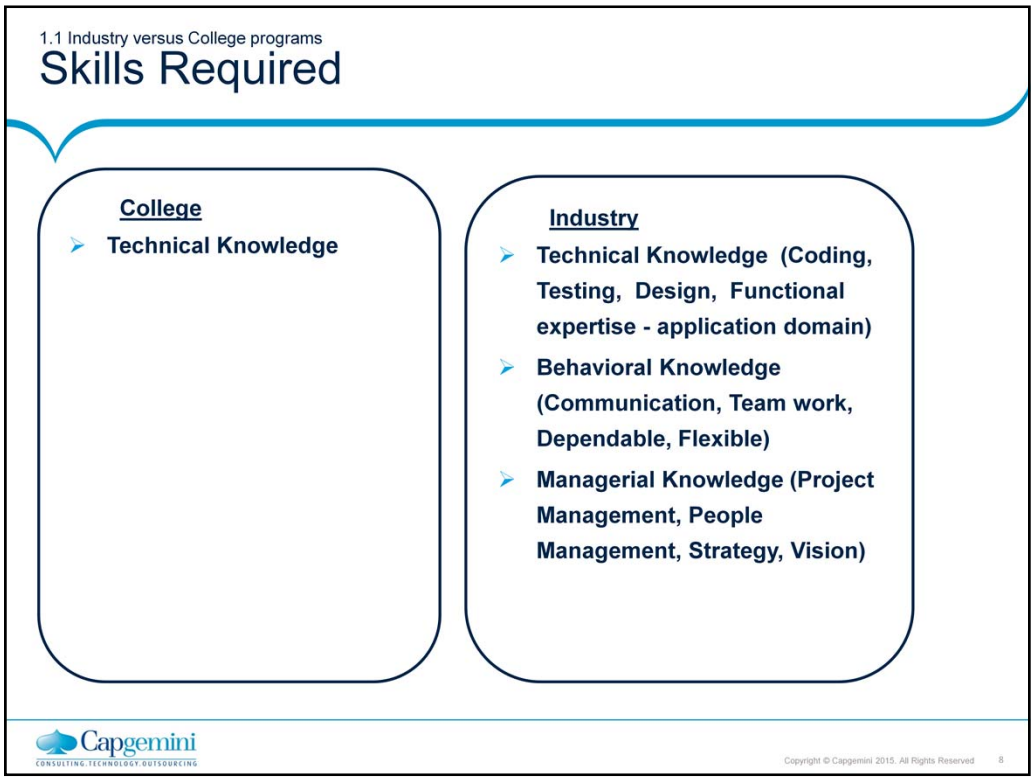

A person require much more technical knowledge for writing industry level applications as compared to writing programs in the college.

In college having good technical knowledge for a particular technology is enough to write program but in industry along with technical knowledge you require some other knowledge like

- What are good programming practices?
- How to write test cases?
- You also should have domain knowledge.
- As we need to work in a team in industry, you also need to improve your communication knowledge. You should be dependable and flexible.
- To reach at managerial level, you need to acquire people management skill, Project management skill over a period of time along with the technical skills

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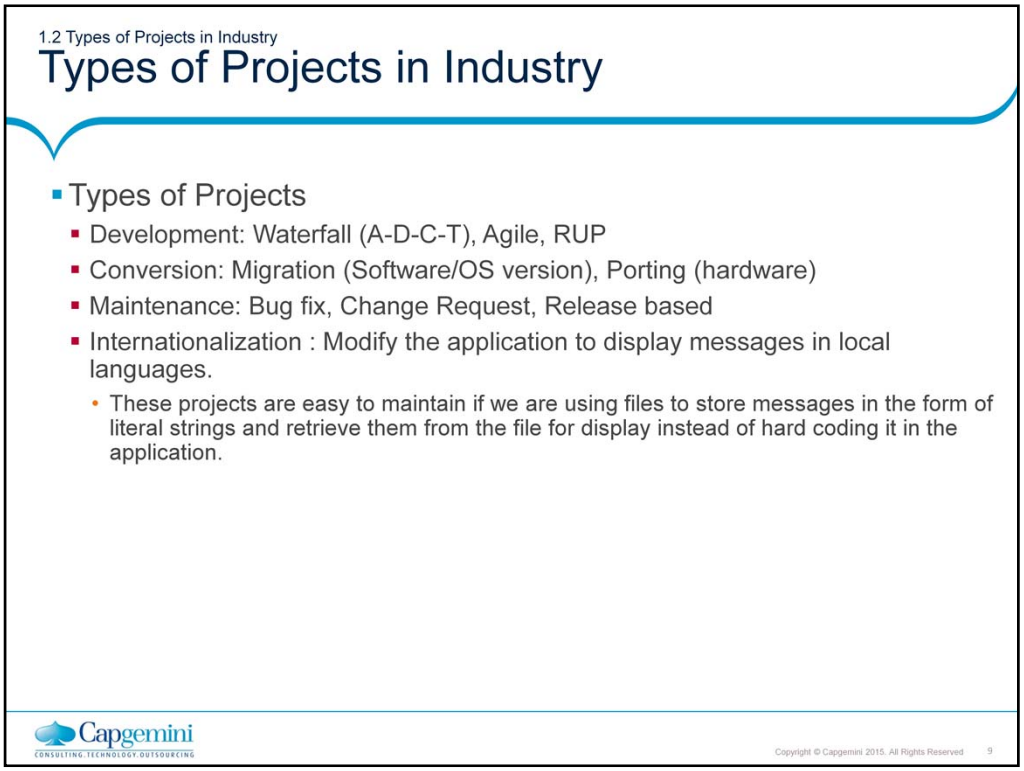
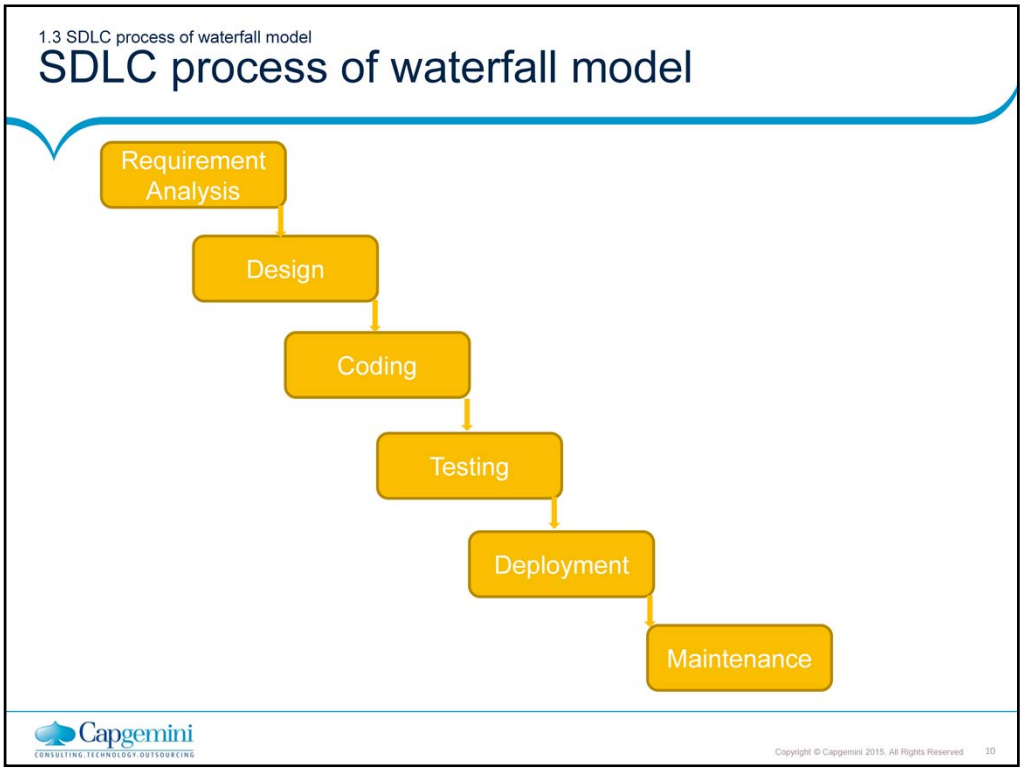


In an industry there are various types of projects like

- **Development Projects:** In these projects we may use different types of life cycles like Waterfall model, Agile, RUP (Rational Unified Process) you need to be familiar with these terms

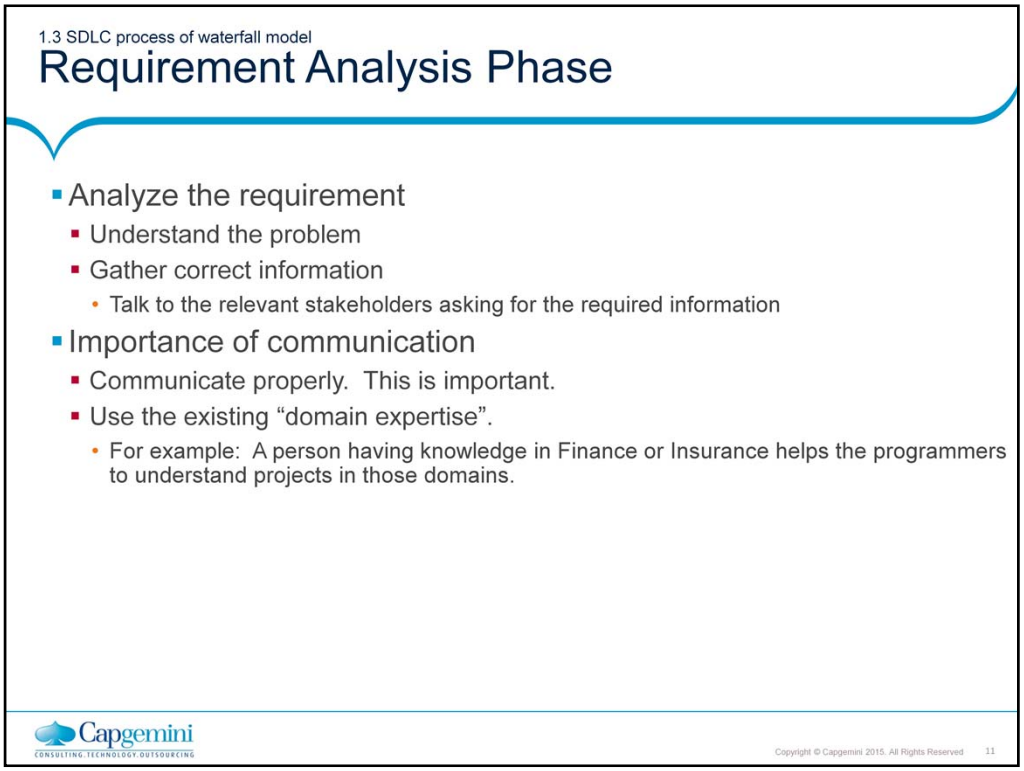
- **Conversion Projects**
  - Migration - It refers to projects like upgrading a software to different version of the OS or DBMS systems
  - Porting – If there is major change in the system like, Hardware Platform has changed.
- **Maintenance projects**
  - Bug fix – If there is an unwanted behavior exists in an existing system due to bug(Problem), then fix the bug by doing changes.
  - Change request – If there are any changes in the functionality are requested from customer such projects are called as changed request type of project.
  - Release base – Products for which periodically the new release of the product is made
- **Internationalization :** Normally most of the applications display messages to user in English but in some cases we may need to change the application to display messages in local language based on the location where we are using it. In such type of projects we need to change the code accordingly. If we have hard coded the messages in the applications then maintenance will be the tedious activity. Hence the good solution for it is store the messages in a file in the form of literal strings and use these files for displaying messages.



Waterfall Model: The waterfall model is a sequential software development model in which development is seen as flowing steadily downwards (like a waterfall) through the phases of requirements analysis, design, coding, testing (validation), deployment, and maintenance.

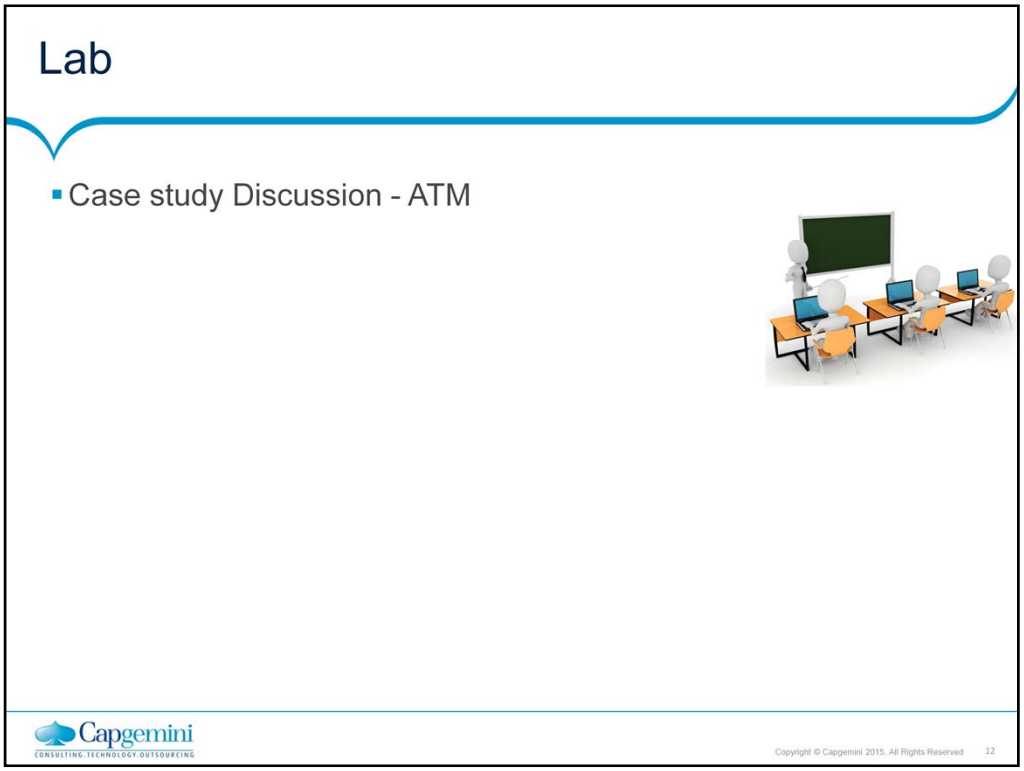
SDLC process of Waterfall Model:

- **Requirement Analysis :** Identify all the requirements. After requirement gathering, analyze the requirements for identifying their validity and the possibility of incorporating the requirements in the system to be developed.
- **Design:** It is a process of creating a detailed specification for a software module . It involves algorithmic design and other implementation specific approaches for a s/w component such as modularity , control hierarchy,, data structures etc. Designers/Technical leads ,senior developers , architects are involved in this phase
- **Coding :** Main objective of this phase is to translate the software design into code , each component identified in design is implemented as a program module following coding guidelines
- **Testing :** Process of checking what's been developed against the requirement.
- **Deployment :** Process of bringing the system into production environment
- **Maintenance :** The maintenance phase involves making changes to hardware, software, and documentation to support its operational effectiveness.



Analyze the requirement:

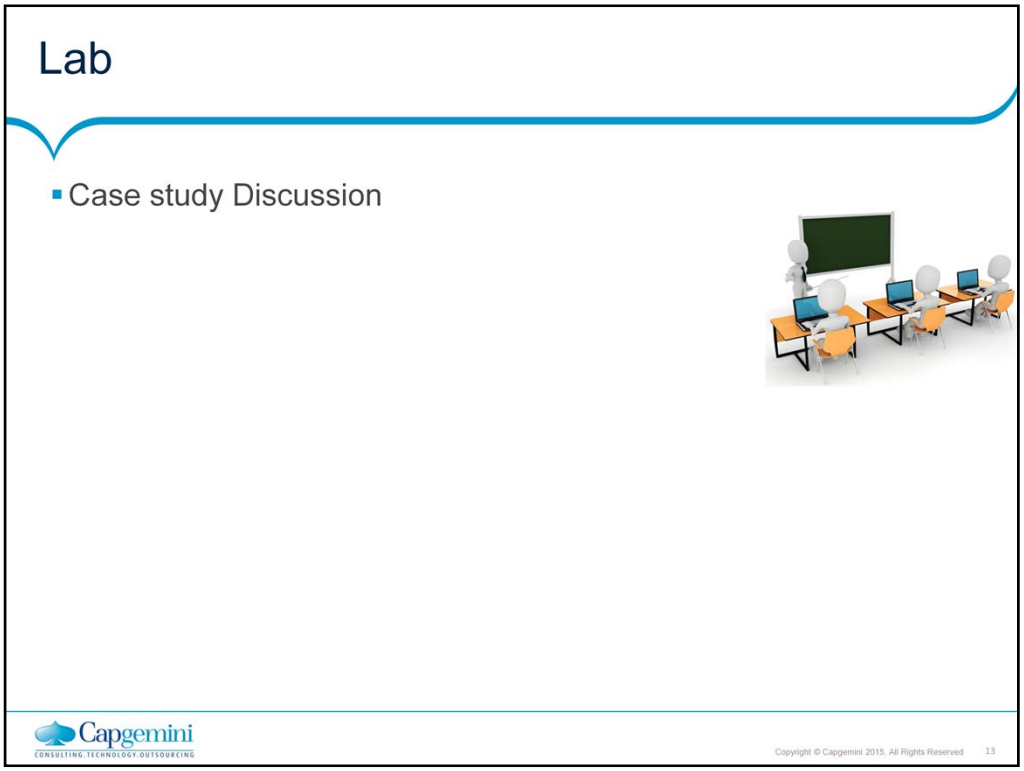
- **Understand the Problem:**
  - Interpret the problem in your own words
  - Determine the outputs required
  - Identify the inputs required to obtain the desired output
  - List out the clarifications required
  - List the assumptions made
  - List the constraints / limitations
- **Gather Correct Information:** Gather the required information from the concern stakeholders by communicating with them.
- **Importance of proper communication:** User talks in language of business, and Programmer talks in the language of technology. Since there is a big gap between these languages, understanding the requirements properly is very important. This is possible through proper communication. The communication exercise is as follows:
  - Consider income tax calculation logic is written by you. If you want to check whether the Income Tax calculation written in the program, is correct as per the current Tax laws? Where can you get this information?
  - Draft an email to the relevant stakeholders, requesting for the required information.



Case Study: The ATM application aims at performing ATM transactions and balance enquiry of an existing account holder in a user friendly way

Following is a list of functionalities of the system. Wherever, the description of functionality is not adequate; you can make appropriate assumptions and proceed.

- The user is requested for the card number and his personal pin number for authentication purpose.
- After authenticating the user, the application requests the user to choose any one of the following options:
    - BALANCE ENQUIRY
    - CASH WITHDRAWL
    - MINI STATEMENT
    - QUIT.
- When the user chooses one of the above options, say ‘1’, the balance of the user is retrieved and displayed. The application further requests the user whether he/she wants the report to be generated and responds accordingly.
- When the user chooses ‘2’, transaction is performed based on the request of the user with the help of the transaction file. Thus after the transaction is complete the user’s account is updated.



Case Study – ATM (Contd..)

- When user wants to generate a record for his/her last 5 DAYS transaction, mini statement is opted where details retrieved from Transaction History File.

Updating balance is done when recharge is successful in Master and Transaction File. Thus, the application requests the user for further processing and responds based on the input from the user.

Case Study 1: In a firm there are 10 salespeople and incentive is paid on the portion of sales that exceeds two thirds of the average sales of the group. List the salesperson receiving incentives along with their incentive amount. Incentive amount is 20% the amount of sales that exceeds the two thirds of the average.

Case Study 2: All candidates have to take three tests. Selection for the interview round is done based on the scores of all the three tests. The individual score in each test has to be greater that 75 and the average score across the three tests should be a minimum of 80. An interview call letter is to be sent to candidates who have been selected and a reject letter is to be sent to the others. The interview stage involves two rounds:

- *Round 1:* qualifying criterion: rating of greater than five on a scale of 1 to 10
- *Round 2:* qualifying criterion: rating of greater than seven on a scale of 1 to 10Candidates go through both rounds of interview.

Selected candidates are sent offer letters and the rest are sent reject letters.

Represent the logic for finding the number of candidates who have been sent interview call letters, who have been sent reject letters and who have been sent offer letters.

1.3 SDLC process of waterfall model

Design Phase

- Design includes translation of the requirements into a logical structure that can be implemented in a programming language.
- The programmer designs the application flow/program using design tools such as
- Flowchart
  - A flow chart, or flow diagram, is a graphical representation of a process or system that details the sequencing of steps required to create output.
- Algorithms
  - An algorithm is a set of instructions for solving a problem. It is a basic technique of how to do a specific task.
- Pseudo code

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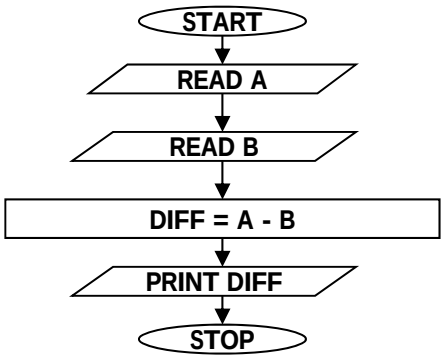
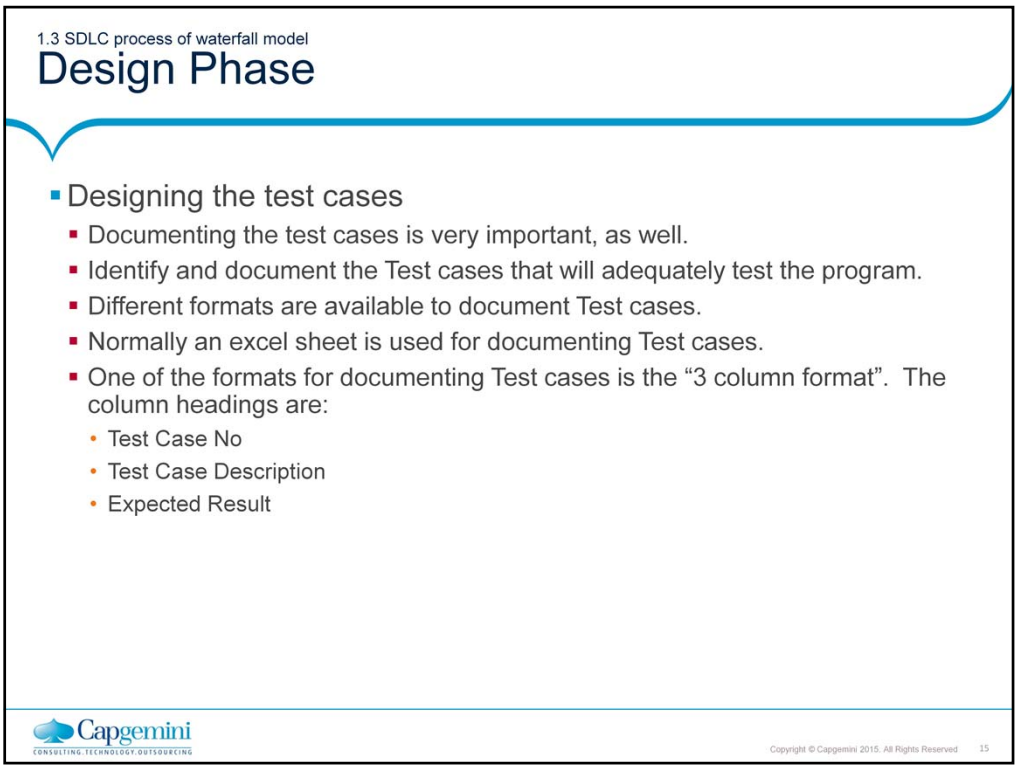
Flowchart: A flow chart, or flow diagram, is a graphical representation of a process or system that details the sequencing of steps required to create output. A typical flow chart uses a set of basic symbols to represent various functions, and shows the sequence and *interconnections* of functions with lines and arrows. Ex: Flow chart to calculate difference b/w two numbers:



Algorithm: An algorithm is a set of instructions for solving a problem. It is a basic technique of how to do a specific task. It takes input, processes it according to a set of instructions, and generates output. An algorithm must provide correct output for every possible input condition. An algorithm must have a definite end point so that when the input has been processed and the desired output achieved, the process stops.

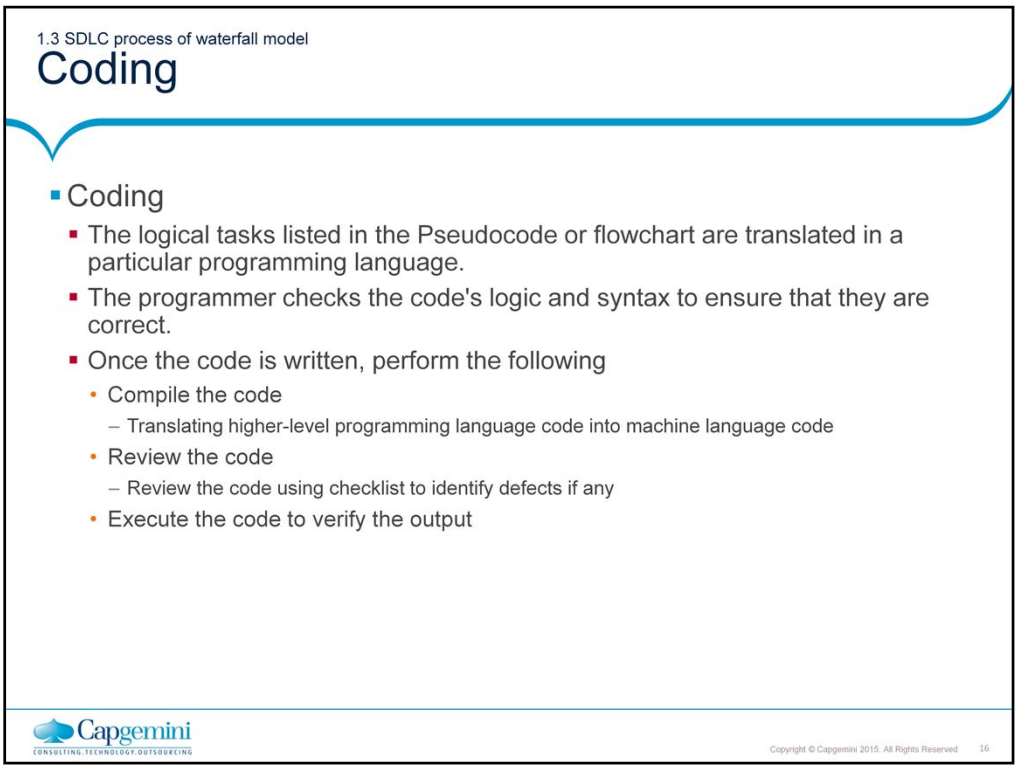
Example: Algorithm to calculate the difference between two numbers

```
Accept two numbers as num1 and num2
Find the difference between num1 and num2
PRINT DIFFERENCE
```



Test case
"A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement."
See the sample test cases given below for checking valid date.

Test Case ID	Test Condition / Scenario	Test Steps	Input/Test Data	Expected Result
TC_1	To check the valid Date	Enter date	10/04/2005	Date should be accepted.
TC_2	To Check the Date when days are entered as Alphabets	Enter day as alphabets. Enter valid month & year	Ten/04/2005	"Enter Valid date"
TC_3	To Check the Date when days are entered as Special Characters	Enter day as special char. Enter valid month & year	!)/04/2005	"Enter valid date"

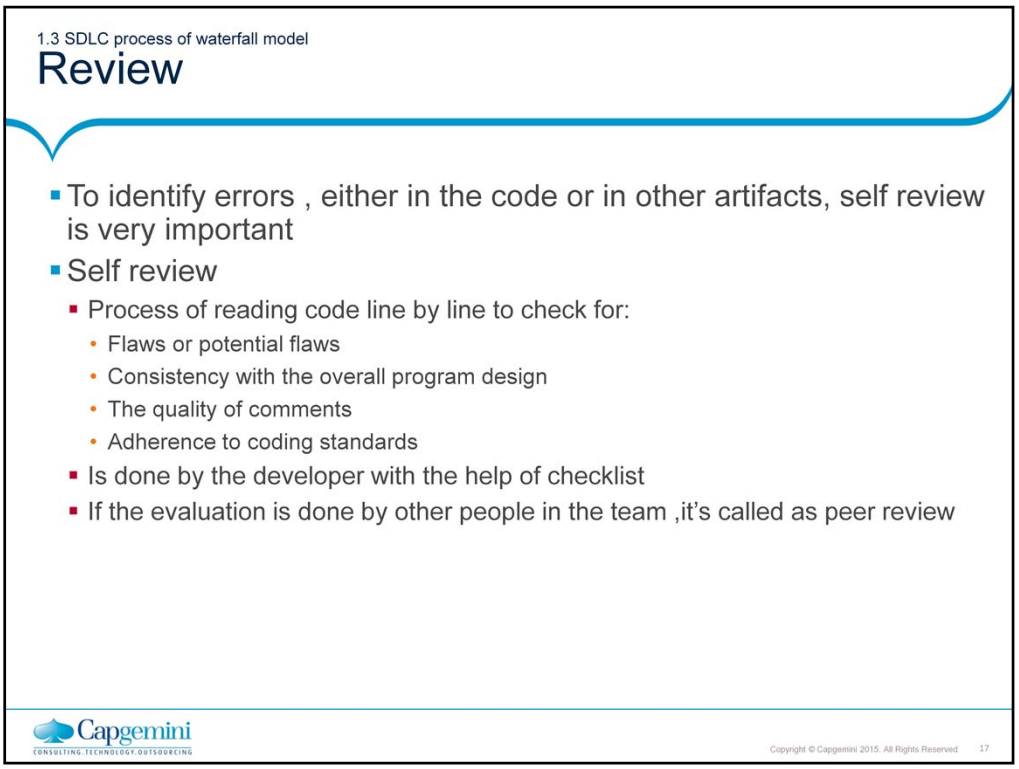


Compiling the code:

- Computers can execute machine language code only.
- The process of translating higher-level programming language code into machine language code is called compiling the program.
  Special programs, called compilers and interpreters, perform this task.
- Code that has errors in it cannot be compiled. The compiler will flag the error, and the programmer must fix the error before trying to compile the code again

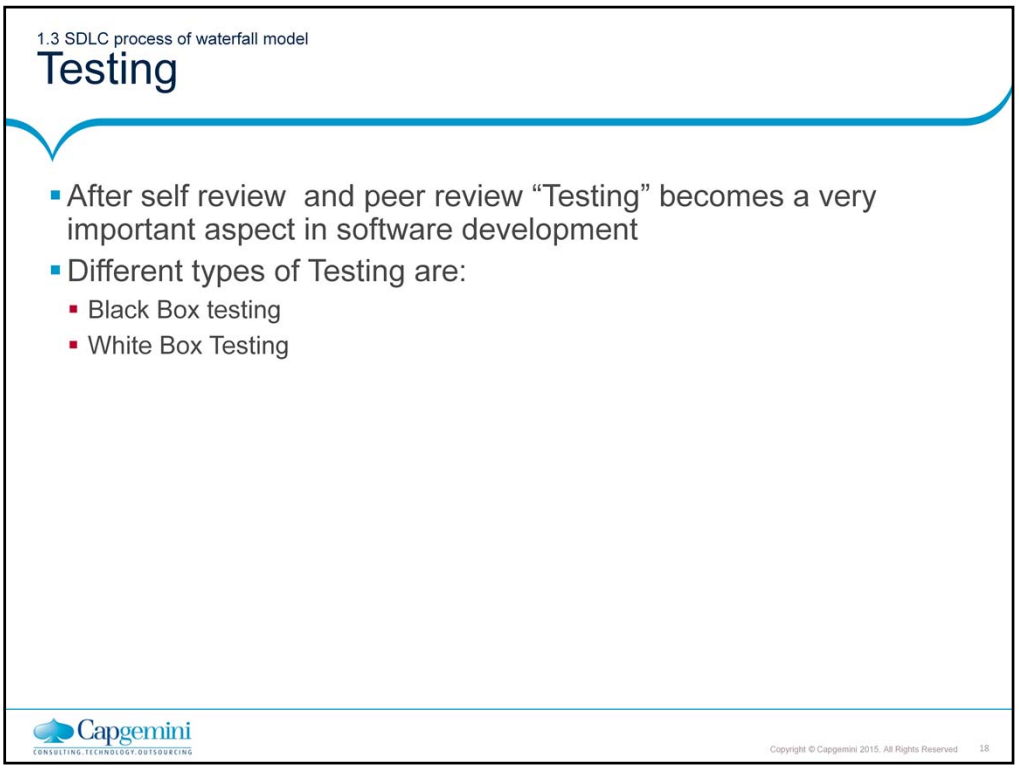
Execute the program and verify the output:

- Once a program is compiled, it can be executed.
- The programmer checks the program's output to ensure that it is correct
- Logic of the program can be checked by using sample inputs and comparing the output obtained with the expected output identified during creation of test cases.



Self review is a process done by the author himself with the aid of tools like checklist, review guidelines, etc..

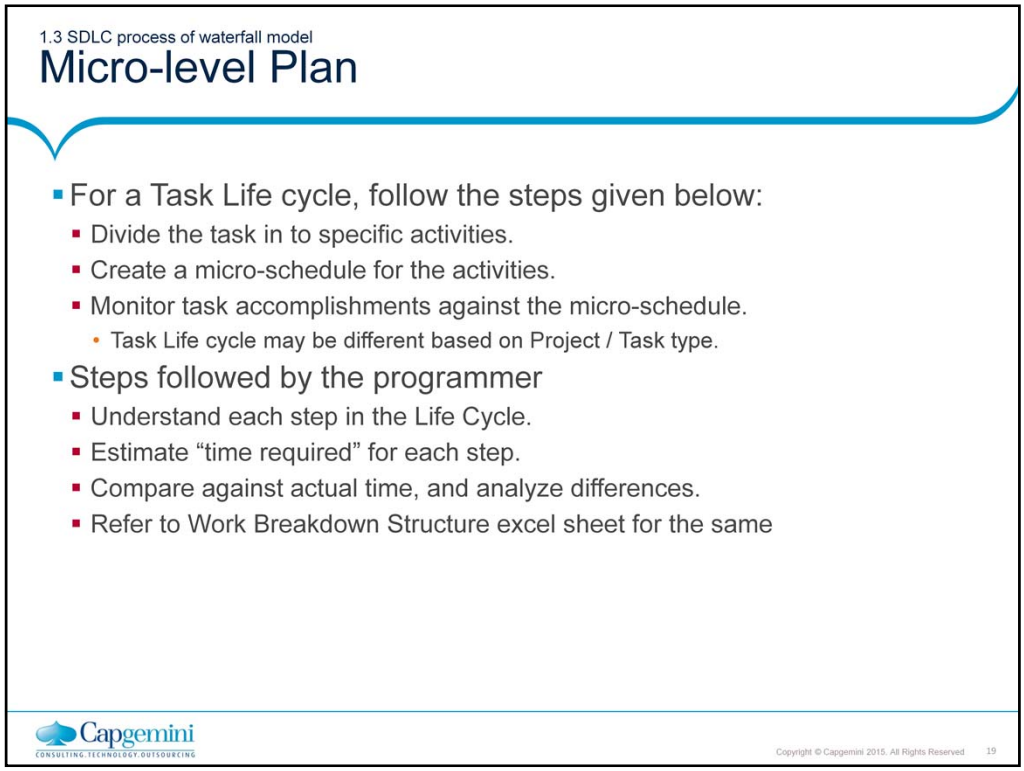
Checklist is a tool with which review can be performed. Checklist is available as an excel document used to verify that all the requirements mentioned in requirement specification is covered and best practices, coding standards are followed.



Different types of testing:

- **Black Box testing** is a software testing method focused on testing whether the input is properly accepted, and output is correctly produced in an application. For an Example, if you want to validate the given input, then use black box testing.

- **White Box testing** is also a software testing method focused on testing the internal structure of the code. For an example, any unreachable path is identifiable using white box testing.

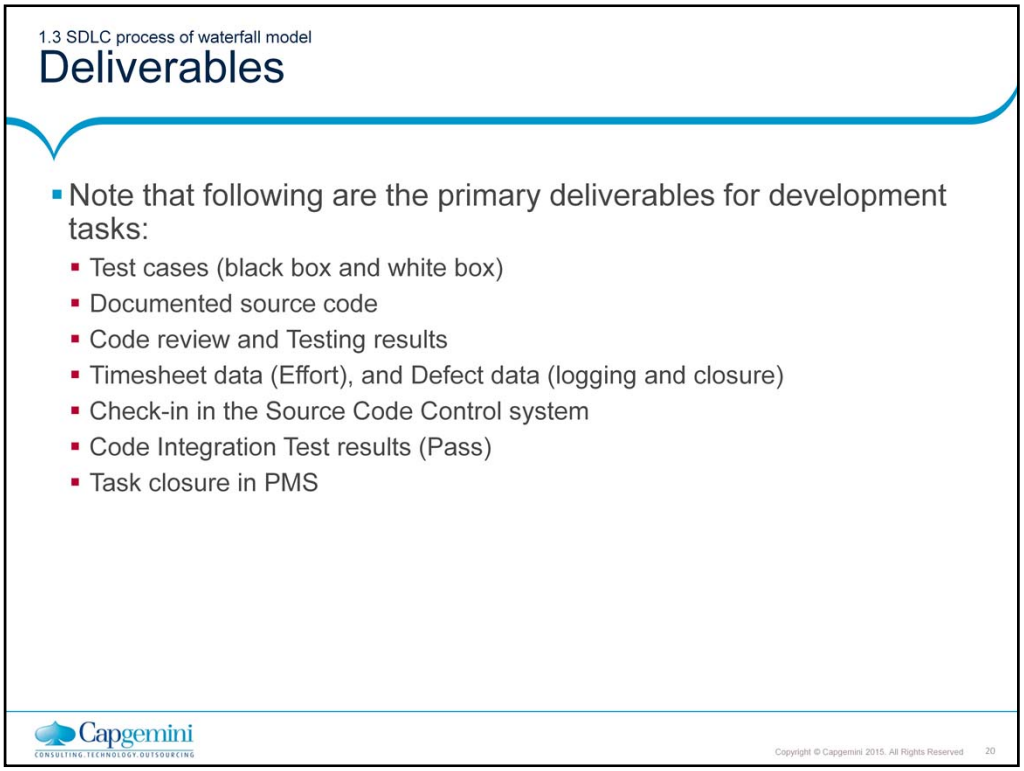


If any of the task is assigned to a programmer then to complete it in time follow the task life cycle.

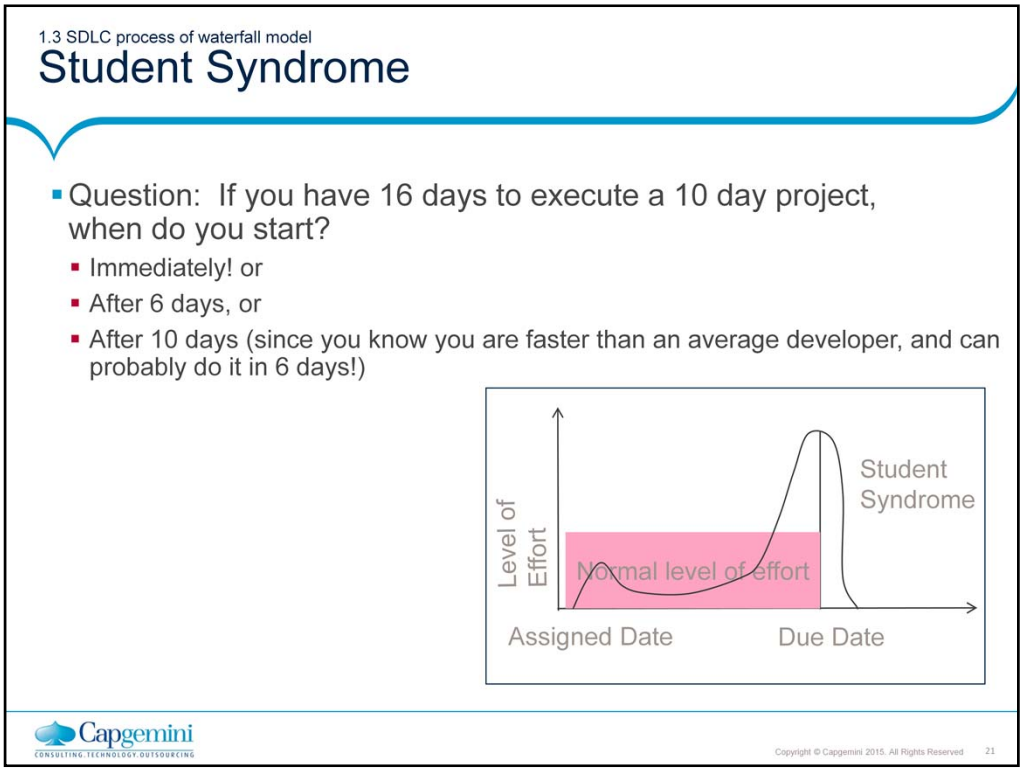
1. The task life cycle means, divide the task in to smaller activities which should be performed in the sequence to complete the task.
2. Decide the time lines for every activity and prepare a micro schedule for the activity
3. Monitor the accomplishment for every activity against the schedule prepared in the previous step. So that we can take care of timely completion of the task. It will also help to improve our ability to estimate the timelines to complete the task.

Task life cycle will be different for different project or different task type

And hence programmer should first understand each step in the life cycle. Estimate the time required for each step and monitor the task completion against the plan.

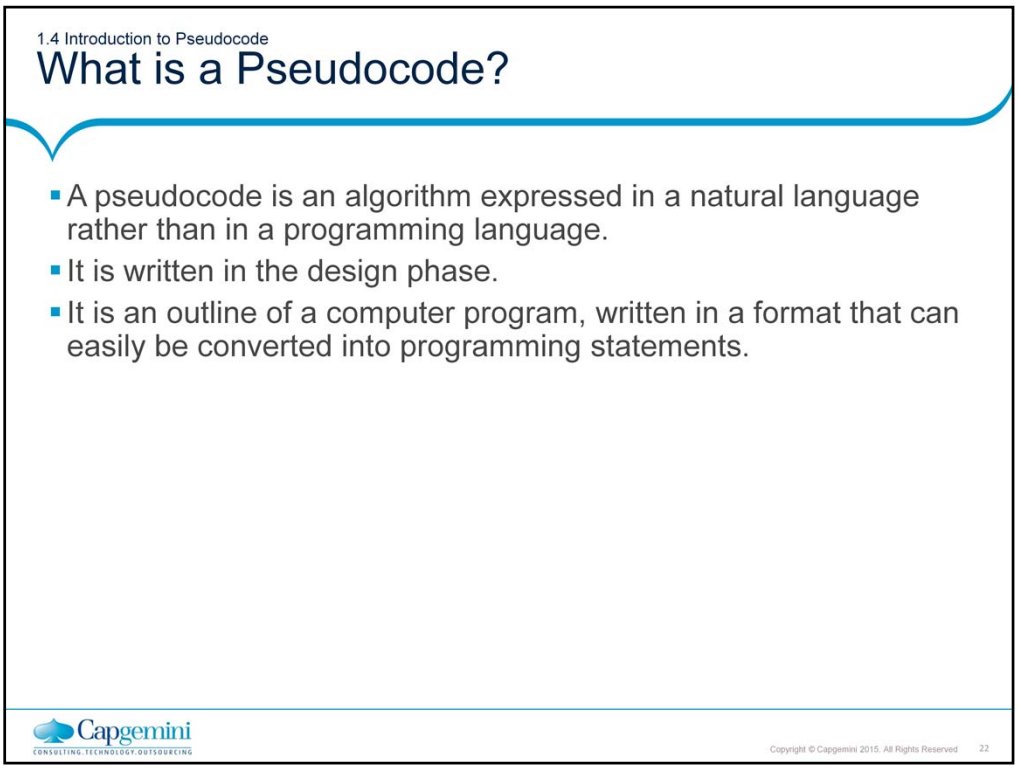


We need to submit above mentioned deliverables.
In defect data we need to log the defect and also mention the closure of it.
Submit the code to configuration management (Check-in in the Source Code Control system). Once the integration test is pass then close the task in PMS (Project Management system). i.e we are ready to work on another task.



Student Syndrome:

- In the above graph. If you observe people are working with less efforts than expected in the beginning and near the dead line people are slogging to complete the work in time.
- This is similar to how a student prepare for the exams for day and night just few days before the exam.
- Avoid student syndromes. While working in project.
- Parkinson's Law:
  - "Work expands to fill (and often exceed) the available time."
- Murphy's Law:
  - "If anything can go wrong, it will!"



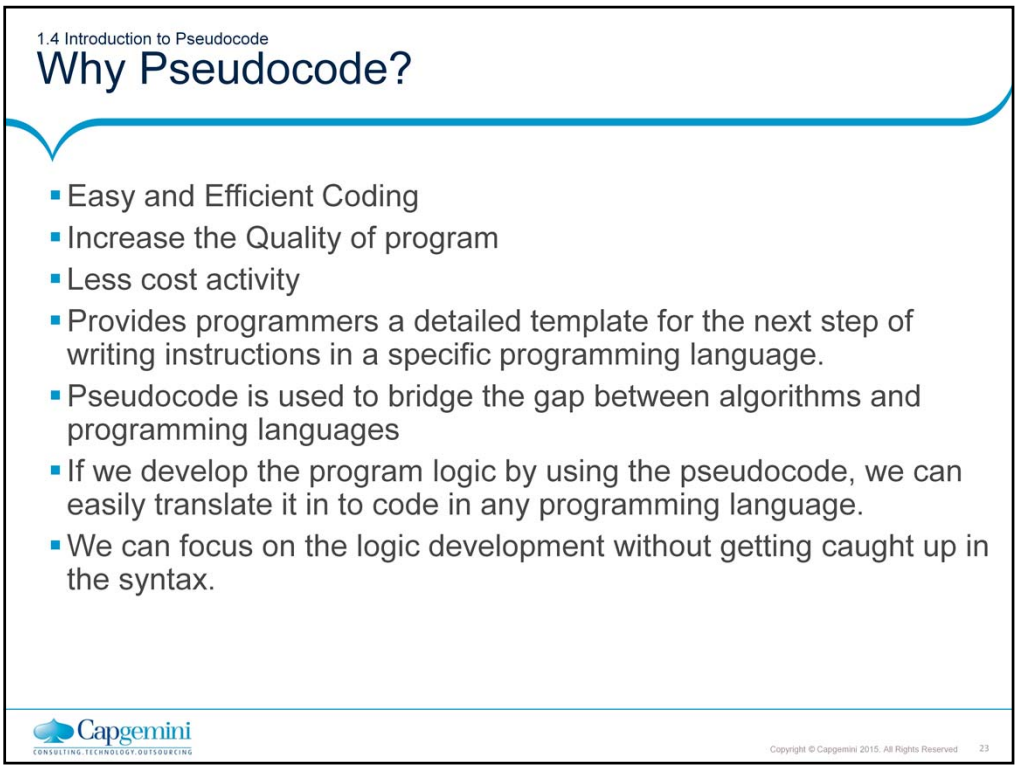
What is Pseudocode?

- Pseudocode is a natural language description of what a computer program must do rather than in a programming language.
- It allows the developer to focus on the logic of the code without being distracted by details of programming language syntax.
- At the same time, the pseudocode needs to be complete. It describe the entire logic of the task so that implementation becomes easier for translating the task line by line into source code.
- The pseudocode describes the logic of the program and acts as a blueprint for the source code to be written by the programmer.

PseudoCode for Finding Whether a number is odd or even:

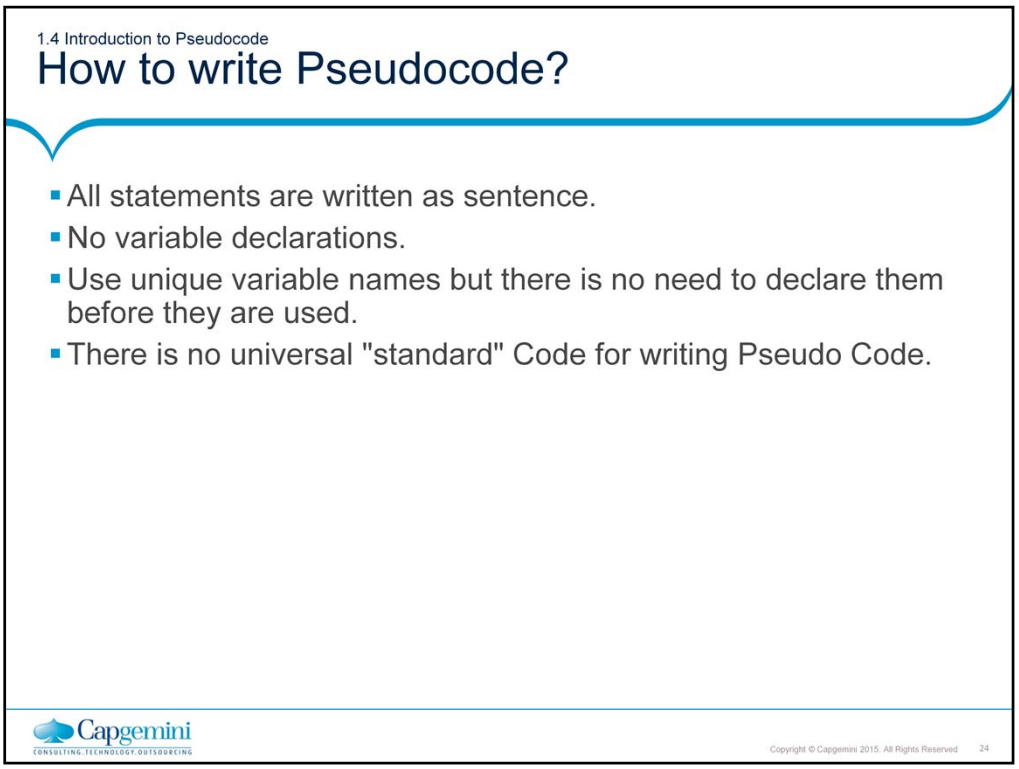
```
BEGIN
        PROMPT "Enter the number" AND STORE IN num
        IF (num MOD 2 == 0) THEN
                DISPLAY "Even Number"
        ELSE
                DISPLAY "Odd Number"
        ENDIF
END
```

PROMPT is a Pseudocode keyword used to take inputs from the keyboard and store in a variable



Why Pseudocode ?

- Easy and Efficient Coding – Easy to solve the task by focusing only on logic of the code with pseudo code rather than any other programming language.
- Increase the Quality of program – Easy way for Analyst to ensure the code matches with design specifications. Once it is matched, then they can easily convert the pseudocode into project specific Language. Thus it helps to ensure requirements are met and that program code meets good software development practice.
- Less Cost activity. Since Catching Logical errors is less tedious than catching them in development process.



Rules to be followed While writing pseudo Code:

- All statements are written as sentence. Use Words and Phrases which are in line with basic computer operations.
- No variable declarations. Use unique variable names but there is no need to declare them before they are used.
- There is no universal "standard" Code for writing Pseudo Code. But for understandable by others in the project follow the common coding standards specific to the project.
- Some of the Common Coding Notations are

Pseudocode Keyword	**Function / Operation**
DISPLAY/PRINT	Output to screen
PROMPT/ACCEPT	Display a prompt and store into a variable
EQUALS or =	Assignment operation
READ	Read from data source (File)
WRITE	Write to data source (File)
INITIALIZE/SET	Give data an initial value

1.4 Introduction to pseudocode

Best practices of writing pseudocode

- There is no absolute standard for pseudocode, these best practices can be followed:
  - Use simple English
  - Write each instruction on a separate line
  - Declare variables in the format of “DECLARE variablename as basictype”, if required
  - Use “initialize” keyword to initialize value to a variable.
  - Capitalize keywords
  - Follow indentation strictly
  - Group instructions into modules.
  - Always use terminators for loops and iteration like ENDLOOP, ENDIF
  - Provide only one entry and one exit point in a Pseudocode using BEGIN and END keyword.
  - Every program and module should have a header preceding it.
  - Module and variable names should be meaningful.
  - Follow all the programming best practices like readable, maintainable, etc.

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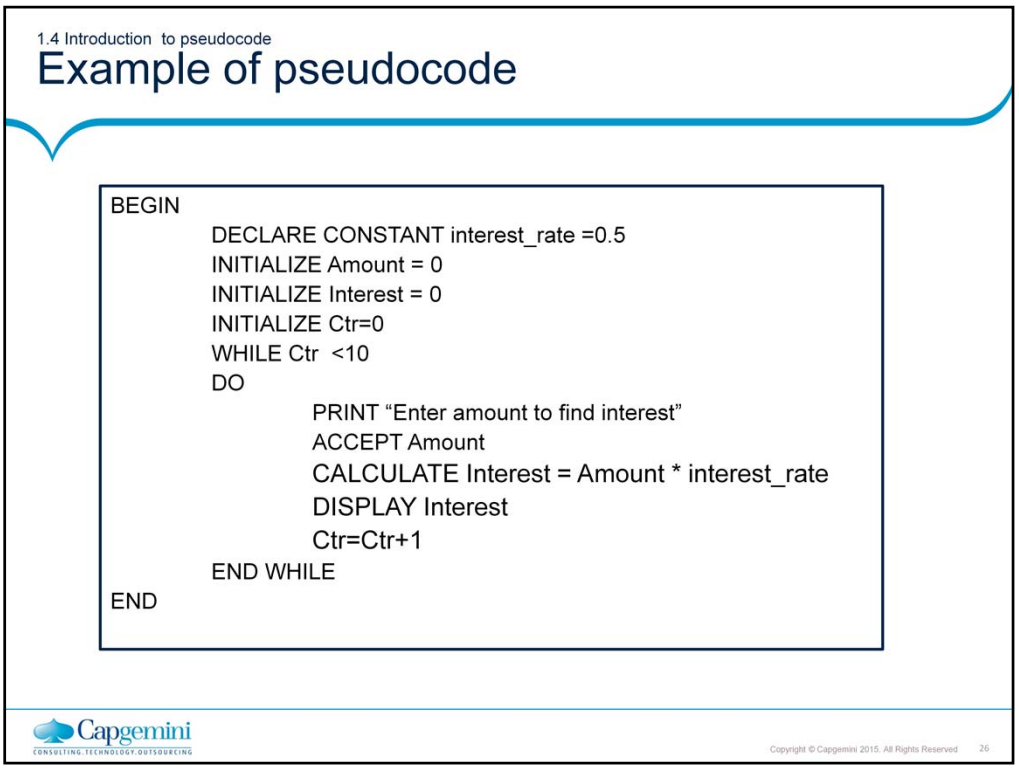
Pseudocode Example with best practices:

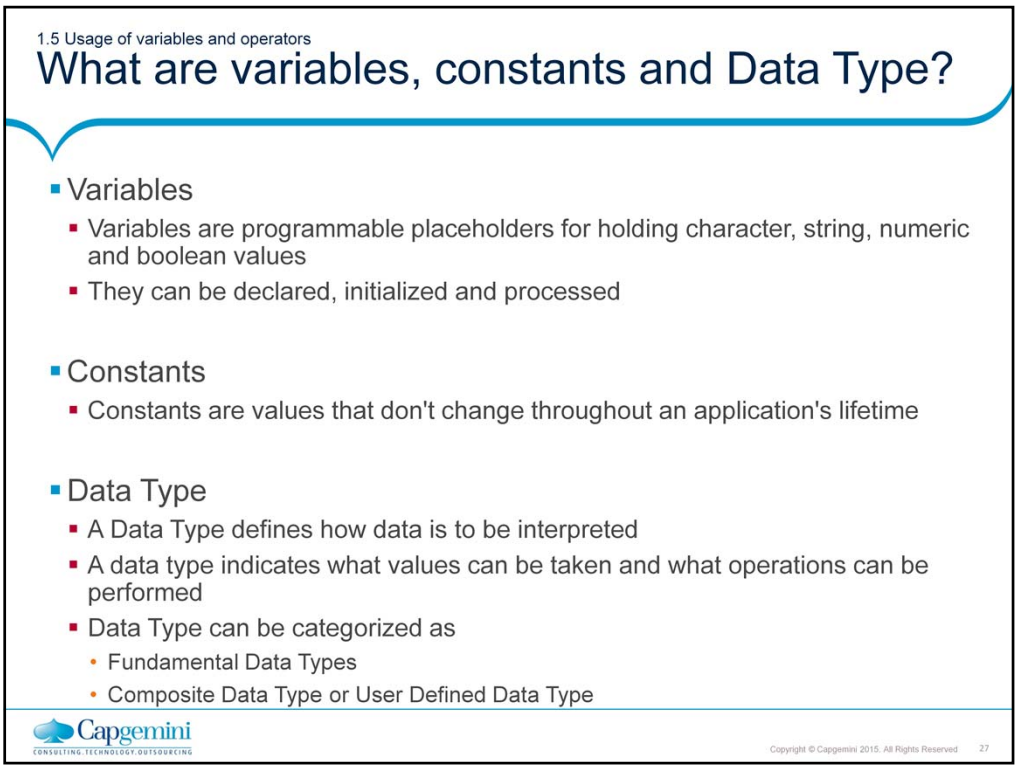
```
BEGIN
        DECLARE num AS INTEGER
         INITIALIZE num TO 0
         PROMPT “Enter the number” AND STORE IN num
         IF(num > 0) THEN
                DISPLAY “Positive Number"
         ELSE
                DISPLAY “NegativeNumber”
         ENDIF
END
```



The above pseudocode is used to calculate interest for a given amount based on fixed interest rate. This process will be repeatedly executed for 10 times.

Fixed Interest Rate is 0.5.

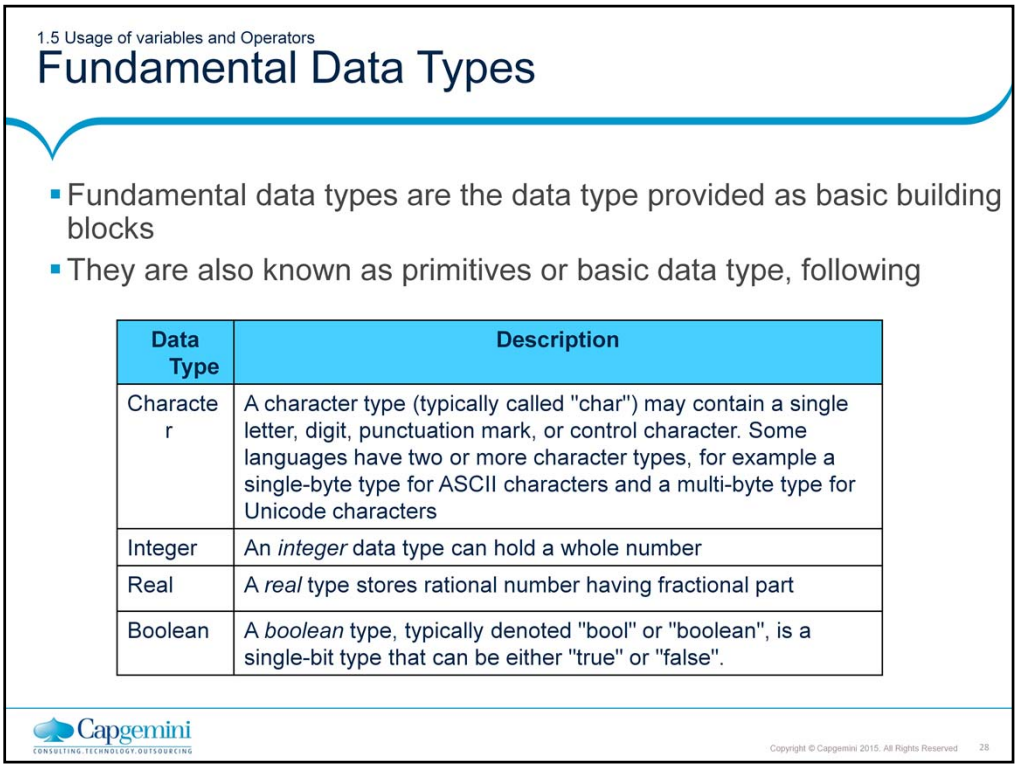
Formulae used to calculate interest is Amount * Fixed Interest Rate.



Variable:

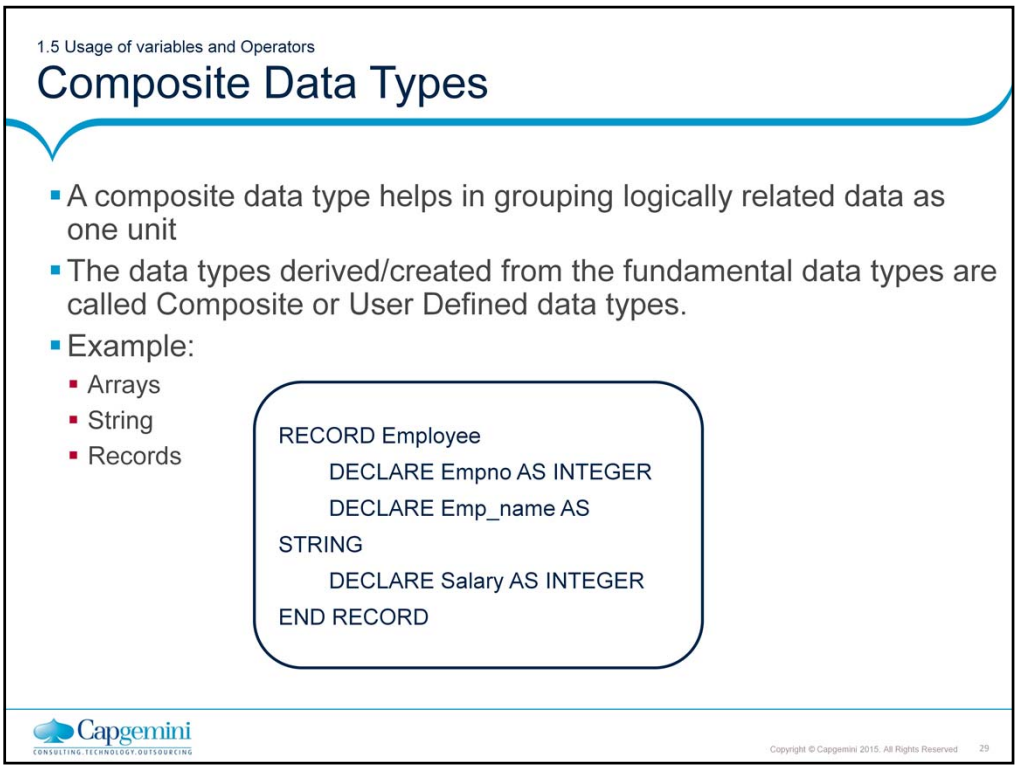
Variable's value can be changed at any point in a program.
Each new value must be of the initial type.
Variable describes data that may change while the program is running

Constants:
Constant describes data that is set before the program is used and will remain the same while the program is running
For example, the mathematical symbols pi and e have well-defined values, which are invariant



Character
The char data type represents single characters, such as ‘m’.
A variable made up of a number of characters is called a string.
Integers
Integers are positive and negative whole numbers
There are different sizes of integers available, including
Short integers and
Long integers
Real
Real data are numbers with a fractional part, for example 8.65 and -0.03
They also include numbers that have no fractional part but are expressed as a whole number with a decimal point, such as 4.0 or -1.0
Boolean
Boolean values are logical values and can be either true or false.

Pointer Data type is integer type
Named Constants are also integers



"Structured data" refers to data that's built up from other types. Use them to clarify relationships between related items

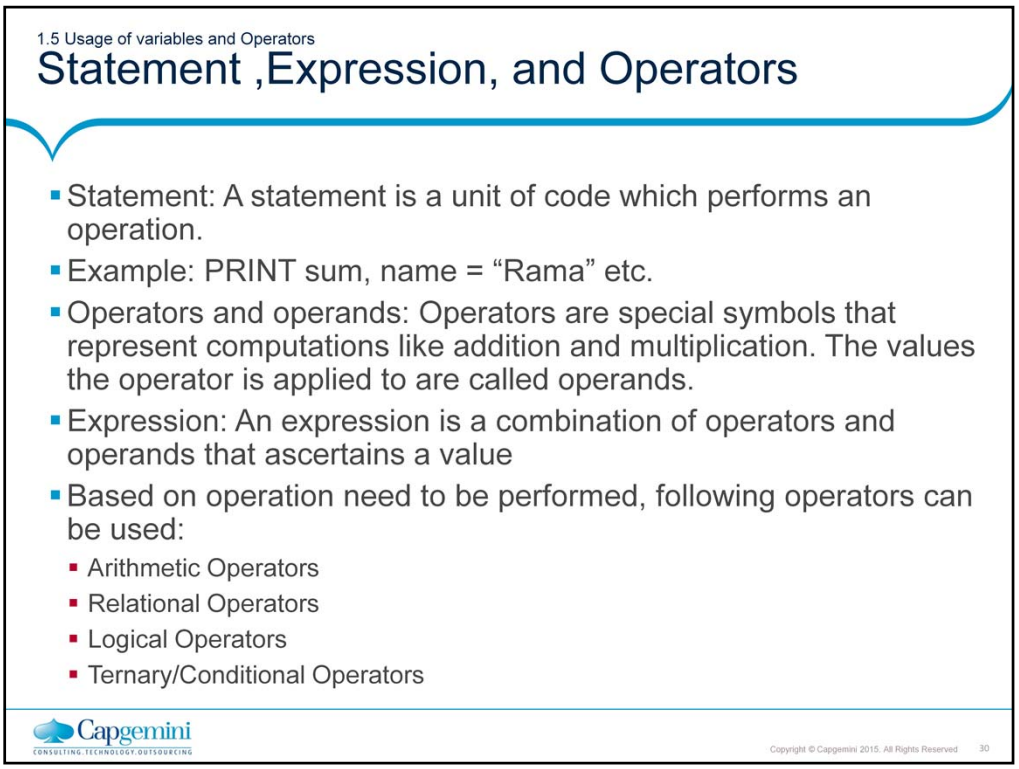
Example :

```
Name   =  InputName;
Address =  InputAdress;
Phone = InputPhone;
Title = InputTitle;
Department = InputDepartment
Bonus = InputBonus
```

```
Employee.Name  = InputName;
Employee.Address = InputAddress;
Employee.Phone = InputPhone;
Supervisor.Title = InputTitle;
Supervisor.Department  = InputDepartment;
Supervisor.Bonus = InputBonus;
```

Why to create user defined datatypes?

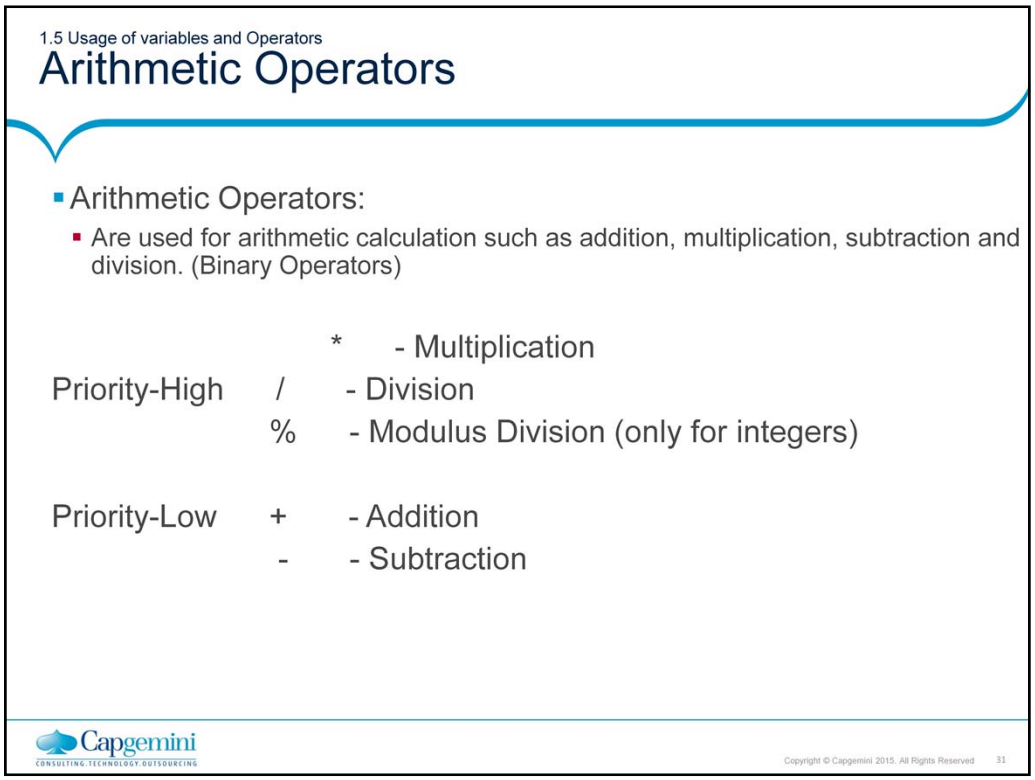
- To increase reliability
  - One could specify the range of values that a variable of a User Defined data type can take.
- To make up for language weakness
  - If a language does not support a type the user wants, it is possible to create it yourself.
  - Example, a student in 'C



Operators and operands, Expression
An operator is a symbol that represents a specific action that must be performed on data

Ex:In the expression *sum=num1+num2*
sum,num1 and num2 are the *operands* and + is the *operator*

Operators have rules of precedence and associativity that are used to determine how expressions are evaluated.
Expressions**:**
An Expression is a combination of constants and variables together with the operators.
Constants and variables by themselves are also considered as expressions. An expression that involves only constants is called a **Constant Expression**.
Note: Balanced parentheses can be used in combining constants and variables.
Operators have been classified into categories based on the operation that they perform. Refer the slide for the different categories.

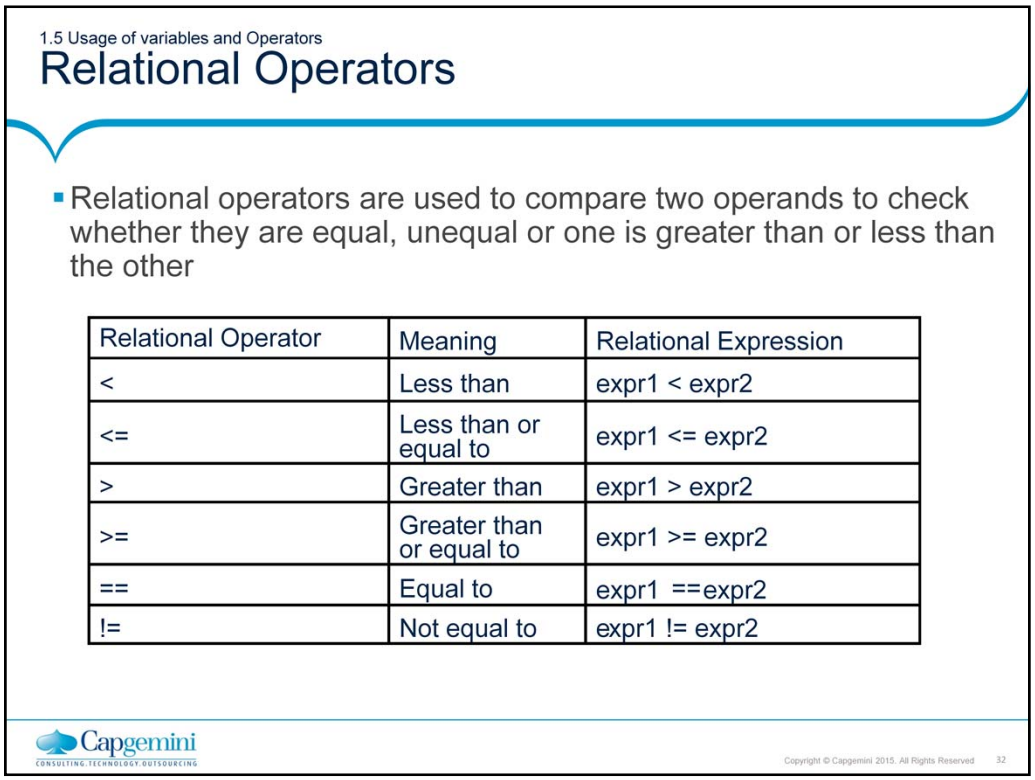


Types of Operators: Arithmetic Operators:

There are five types of arithmetic operators that are used for arithmetic calculations such as, addition, subtraction, multiplication and division.

These five operators are binary operators that is, they require two operands.

Each of these operators work with values of type integers, Real and character.

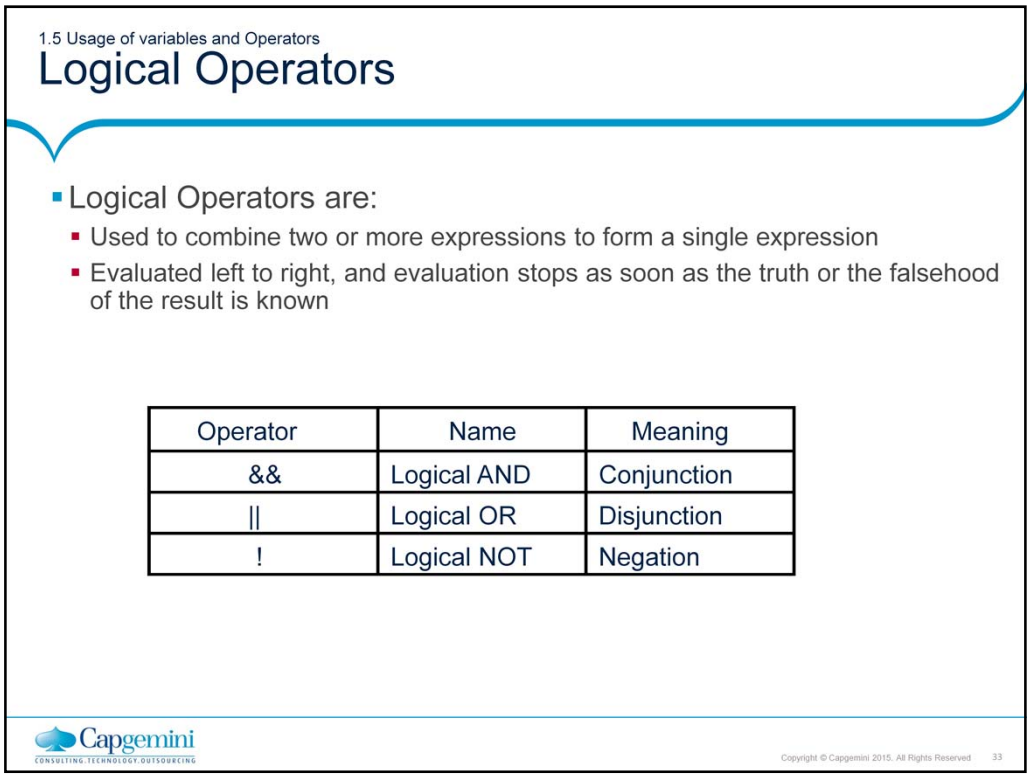


Types of Operators: Relational Operators:

Relational Operators are used to compare two operands to check whether they are equal, unequal or one is less than or greater than the other.

There are six relational operators for comparing the values of two expressions and the expression so formed is called a Relational Expression.

Table provided in the slide shows relational operators and how they can be used to compare expressions expr1 and expr2.



Types of Operators: Logical Operators:
There are three logical operators for combining expressions into logical expressions.
Table in the slide shows available logical operators

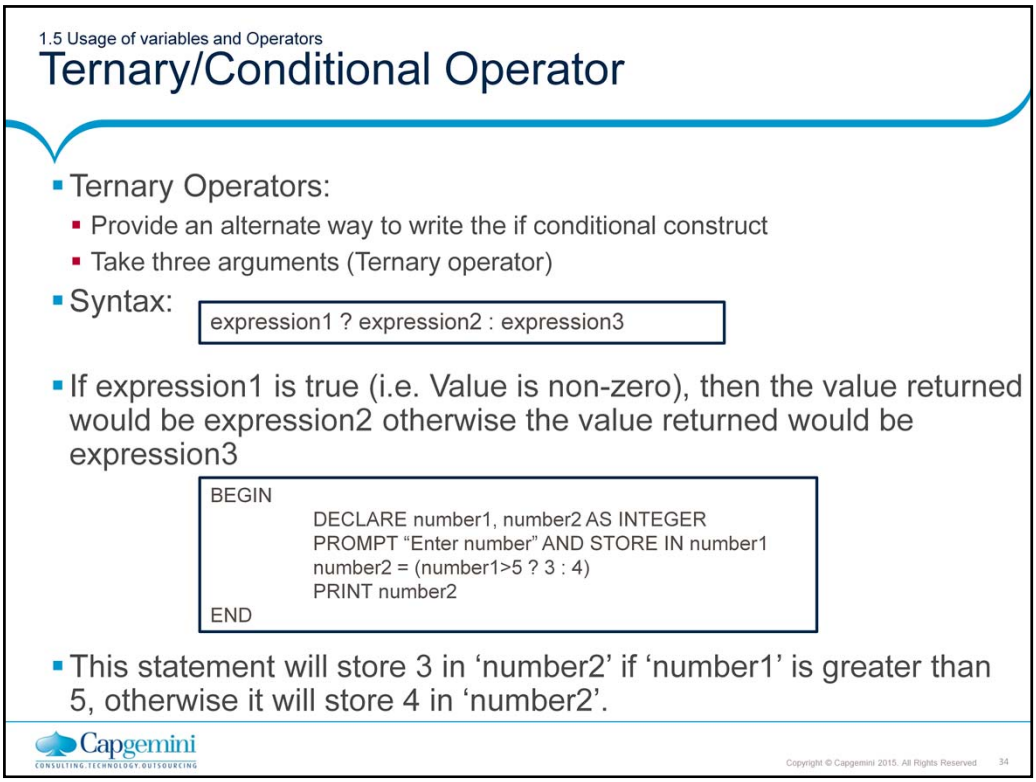
The logical operators **&&** and **||** are binary operators, and ! is a unary operator.
The value of a logical expression is either '1' or '0', depending upon the logical values of the operands. The operands may be of any arithmetic type. The result is always an integer.

Logical AND Operator(&&):
The && operator combines two expressions into a logical expression and has the following operator formation:

expr1 && expr2

An expression of this form is evaluated by first evaluating the left operand. If its value is 0 (false), then right operand is not evaluated and the resulting value is 0 (false).

If the value of left operand is nonzero (true), the right operand gets evaluated. The resulting value is 1 (true) if the right operand has nonzero value (true) and 0 (false) otherwise.



Types of Operators: Ternary Operators:
Simple condition operations can be carried out using the conditional operator (? :). The conditional operator is a ternary operator that is, it takes three arguments. It has following operator formation:

expression1 ? expression2 : expression3

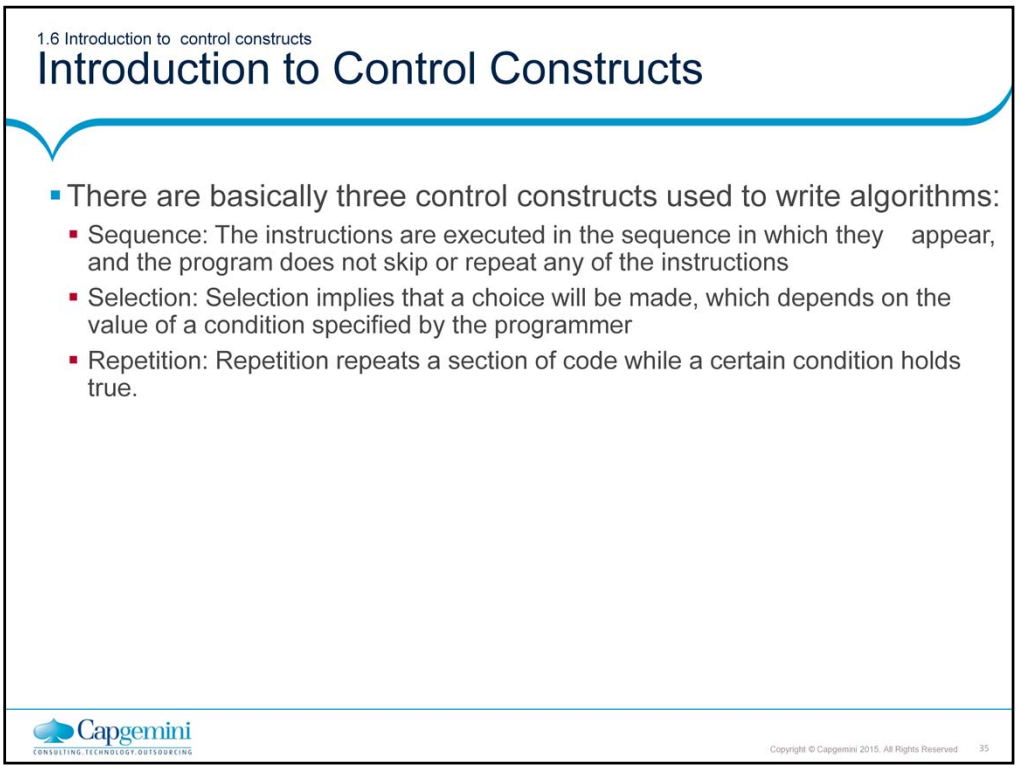
Where ? and : are the two symbols that denote this operator. A conditional expression is evaluated by first evaluating expression1. If the resulting value is true, then expression2 is evaluated and the value of the expression2 becomes the result of the conditional expression. Otherwise, expression3 is evaluated and its value becomes the result.

This is used to assign one of the two values to a variable depending upon some condition.

For example:

big = num1 > num2 ? num1 : num2 ;

assigns value of num1 to big if num1 is greater than num2, else assigns the value of num2 to big.


1.6 Introduction to control constructs
Introduction to Control Constructs
There are basically three control constructs used to write algorithms:
Sequence: The instructions are executed in the sequence in which they appear, and the program does not skip or repeat any of the instructions
Selection: Selection implies that a choice will be made, which depends on the value of a condition specified by the programmer
Repetition: Repetition repeats a section of code while a certain condition holds true.
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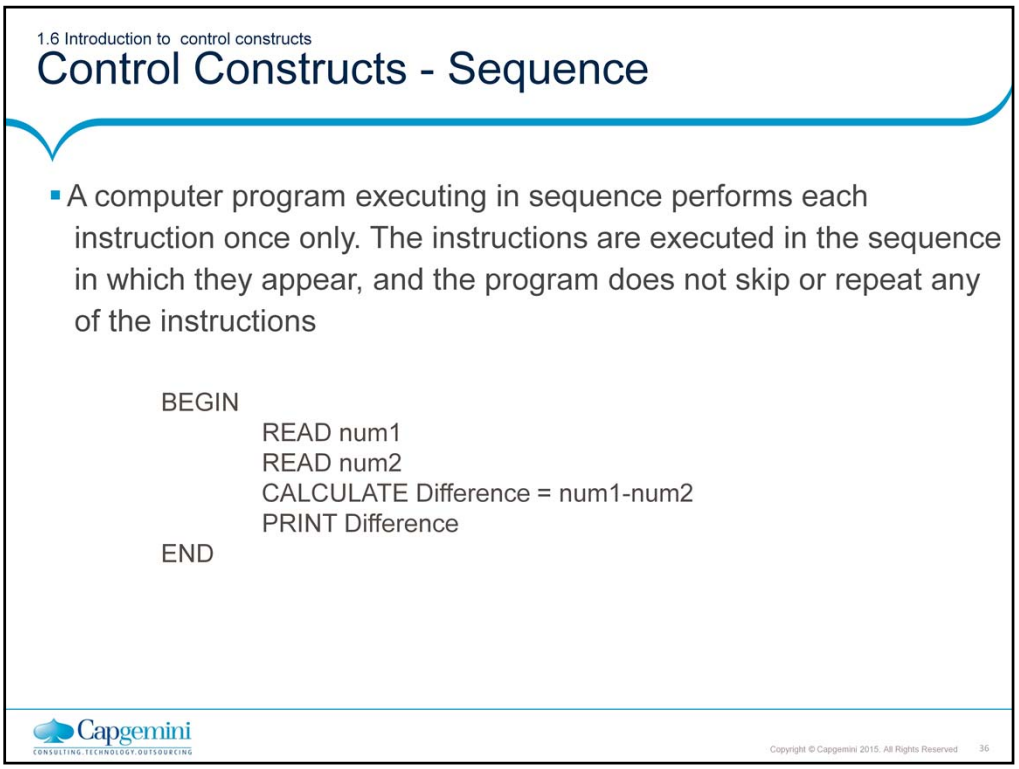

Pseudocode given in the slide is used to find the difference between two numbers. In the above pseudocode, each instruction will be executed sequentially.

1.6 Introduction to control constructs

Control Constructs - Selection

- Selection implies that a choice will be made, which depends on the value of a condition specified by the programmer
- Two forms of selection are there:
  - **If…then**

```
IF num = 0 THEN
    PRINT " Number is zero"
END IF
```

  - **If…then…else**

```
IF num > 0 THEN
    PRINT " Number is positive"
ELSE
    PRINT " NUMBER is
negative"
END IF
```

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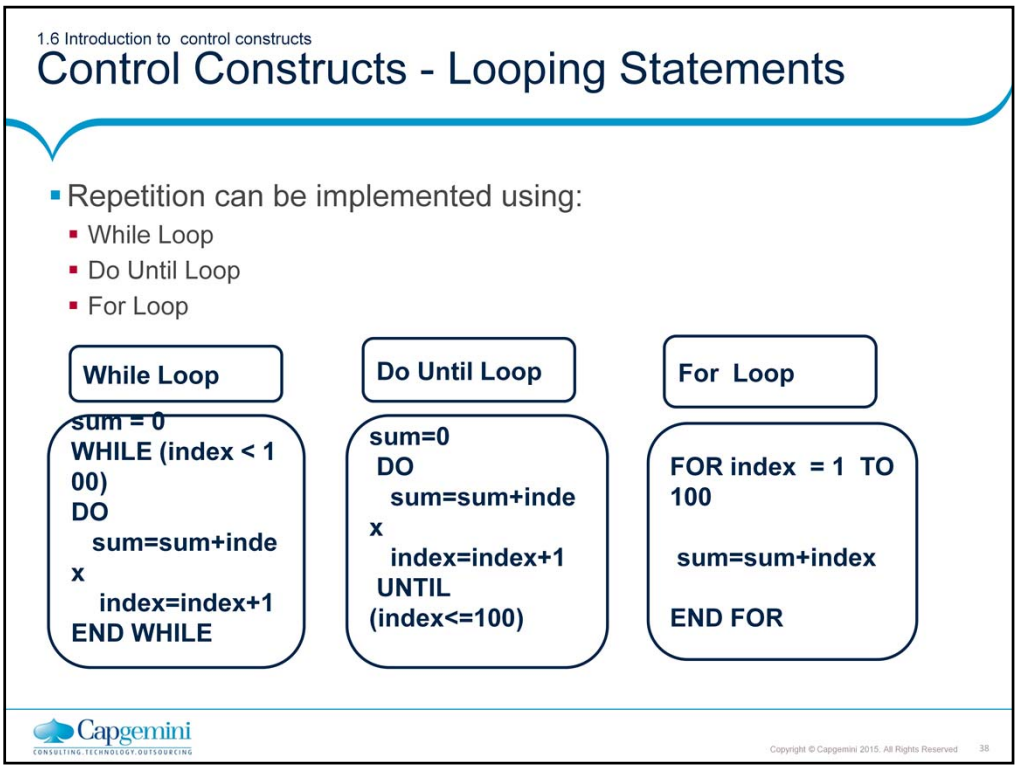


Control Constructs – Looping Statements

Do Until Loop: Set of statements inside the block is executed and then the condition is checked. Executed till the condition is true. Block will be executed at least once irrespective of the condition

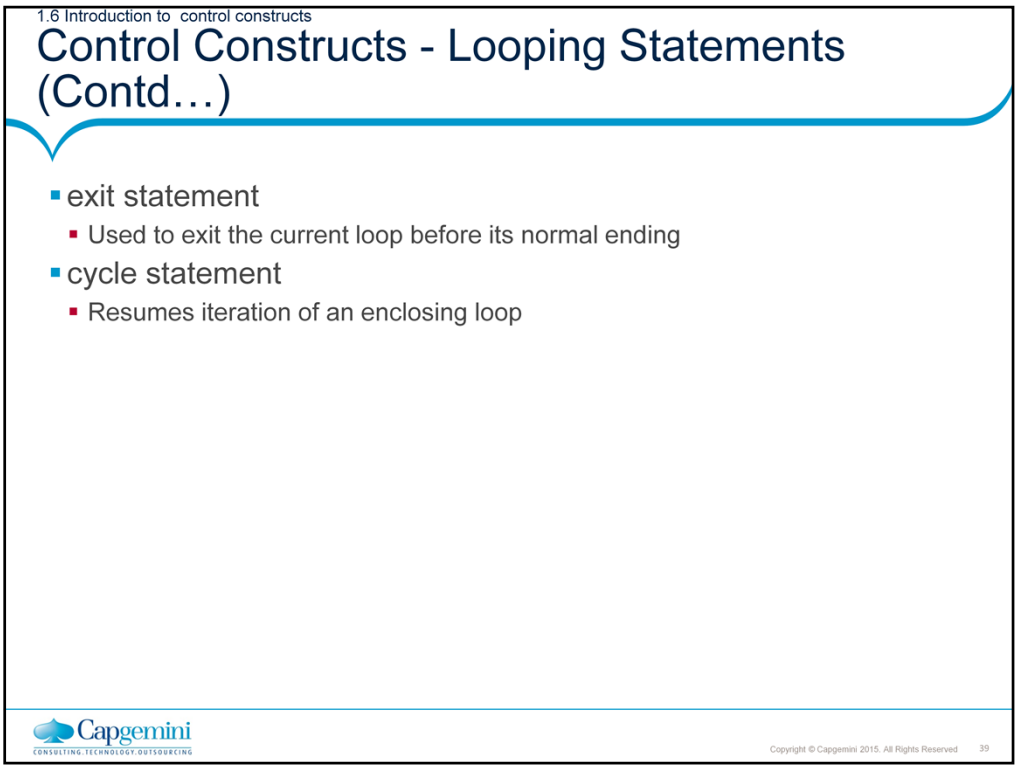
Example:

```
seats_allocated = 0
 DO
   GET booking
   PRINT ticket
   ADD 1 to seats_allocated
UNTIL (seats_allocated < 60)
```

For Loop:Consists of set of statements that are executed for a fixed number of iterations Must specify a starting value, ending value and incrementing value

Example:

```
FOR seats_allocated  = 1  to 25
    Get booking
    PRINT ticket
END FOR
```

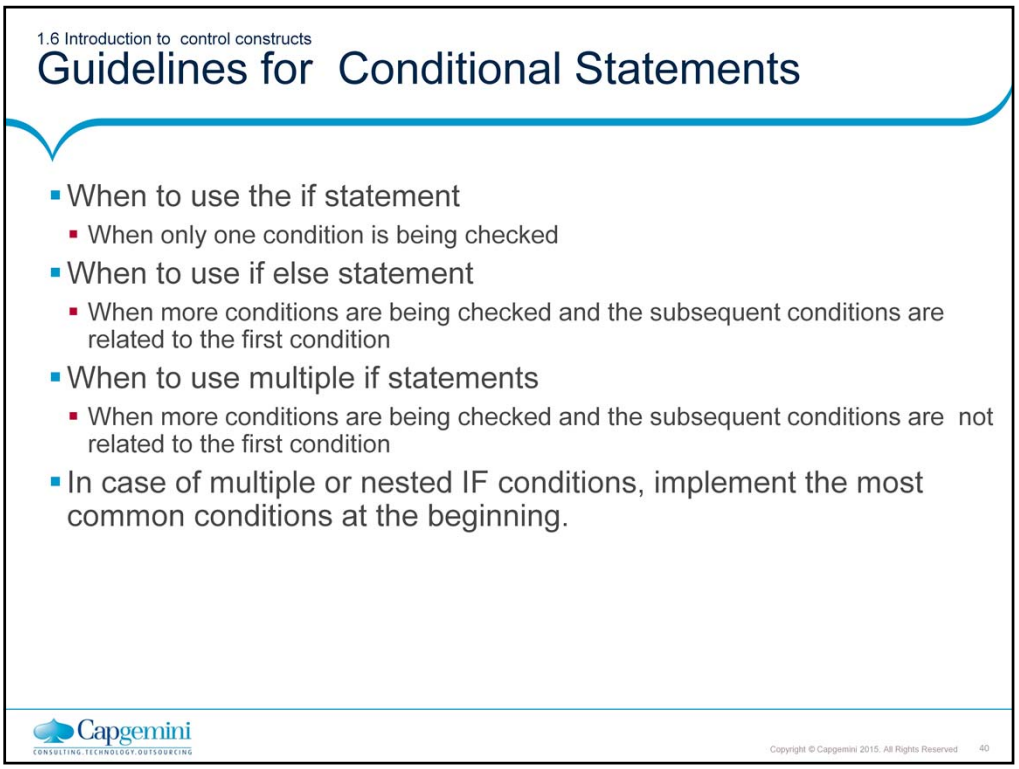


Control Constructs – Looping Statements (contd..)

Example: Cycle and exit statement(check no is odd or even until user wants to stop)

```
BEGIN
    WHILE(TRUE)
        PRINT "Enter a NUMBER"
        ACCEPT num
        IF (REMAINDER of num/2 = 0) THEN
                PRINT "Number is EVEN"
        ELSE
                PRINT "Number is ODD“
        END IF
         PRINT "Enter u'r Choice , Continue with another number?[Y/N]"
         ACCEPT choice
          IF(choice='Y') THEN
                cycle
          ELSE
                exit
     END WHILE
END
```

In above example cycle statement will transfer the control to the beginning of the while loop. Exit statement will transfer the control out of while loop.



Consider Pseudocode has to be written for accepting a number from user and need to identify whether the given number is falling under any of the below mentioned category

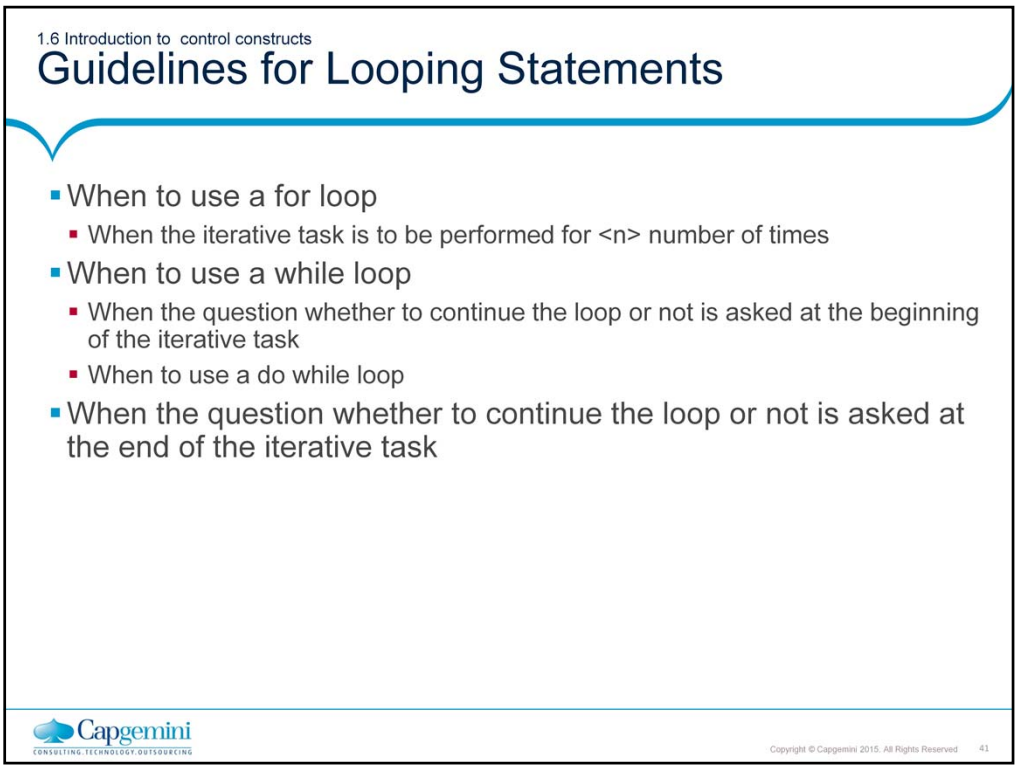
- zero
- negative
- Positive

Think which condition statement is more suitable for this?

Answer: As the given number has to be compared against minimum 2 conditions, IF-ELSEIF-ELSE is more suitable

Pseudocode:

```
BEGIN
        DECLARE num AS INTEGER
        PROMPT “Enter a number” AND STORE IN num
        IF ( num== 0 )THEN
                PRINT "The value you entered was zero.“
        ELSE IF ( num< 0 ) THEN
                PRINT  "The value is negative.“
        ELSE
                PRINT  "The value is positive.“
        END IF
END
```



Consider Pseudocode has to be written for finding sum of n numbers by accepting "n" value from the user. For an Example, if given "n" value is 5, then sum of value is 15(1+2+3+4+5).

Think which looping statement is more suitable for this scenario?

Answer: As the given number has to be used as upper limit for process to be executed repeatedly, use for loop to describe lower limit and upper limit.

Pseudocode:

```
BEGIN
        DECLARE num, count, sum AS INTEGER
        PROMPT "Enter the value of n" AND STORE IN num
        FOR COUNT = 1 TO num
                sum+=count;
        END FOR
        PRINT "Sum is " + sum
END
```

Demo : Variables, Operators and Control Constructs

- Refer the pseudo code available in the below listed files for understanding the usage of variables, operators and control constructs
  - ArithmeticOperators
  - TernaryOperators
  - IF-ELSEIF-ELSE
  - LogicalOperators
  - DoUntil
  - WHILE-CYCLE-EXIT
  - ForLoop

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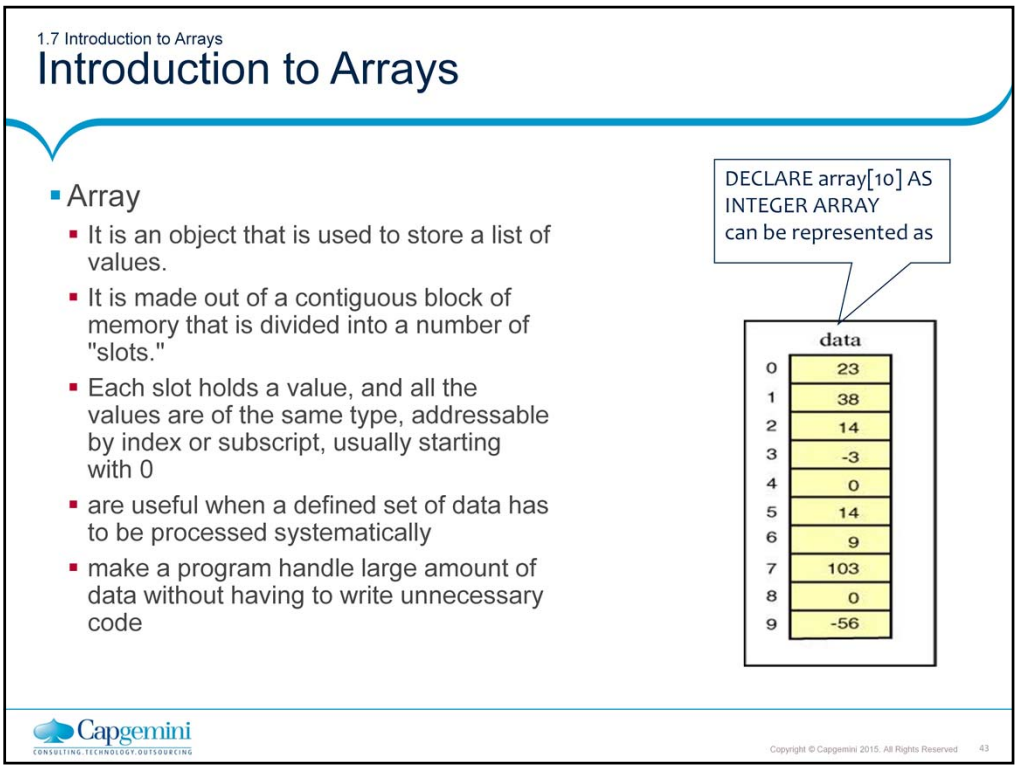
Faculty will be sharing the below mentioned files. Refer the same to understand the usage of variables, operators and control constructs

- ArithmeticOperators.txt
- TernaryOperators.txt
- IF-ELSEIF-ELSE.txt
- LogicalOperators.txt
- DoUntil.txt
- WHILE-CYCLE-EXIT.txt
- ForLoop.txt



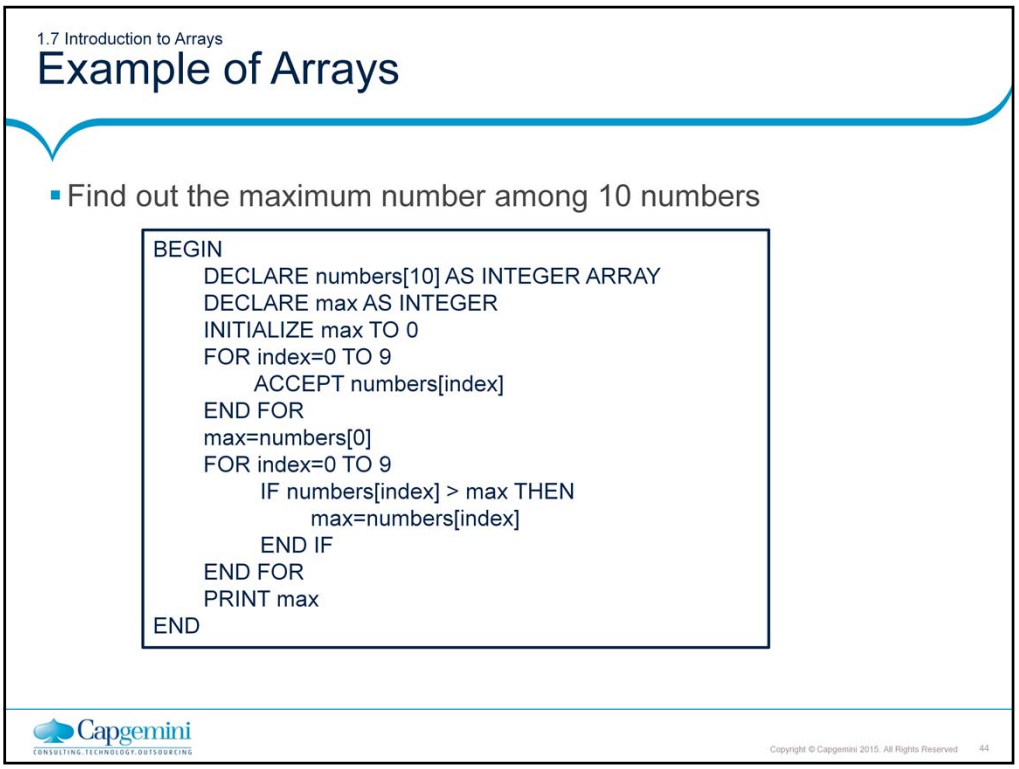
When to go far an Array?

- When there is a finite set of logically related information that needs similar processing
- For example calculating the grade of all students of a particular class
- All data's are similar and of one data type

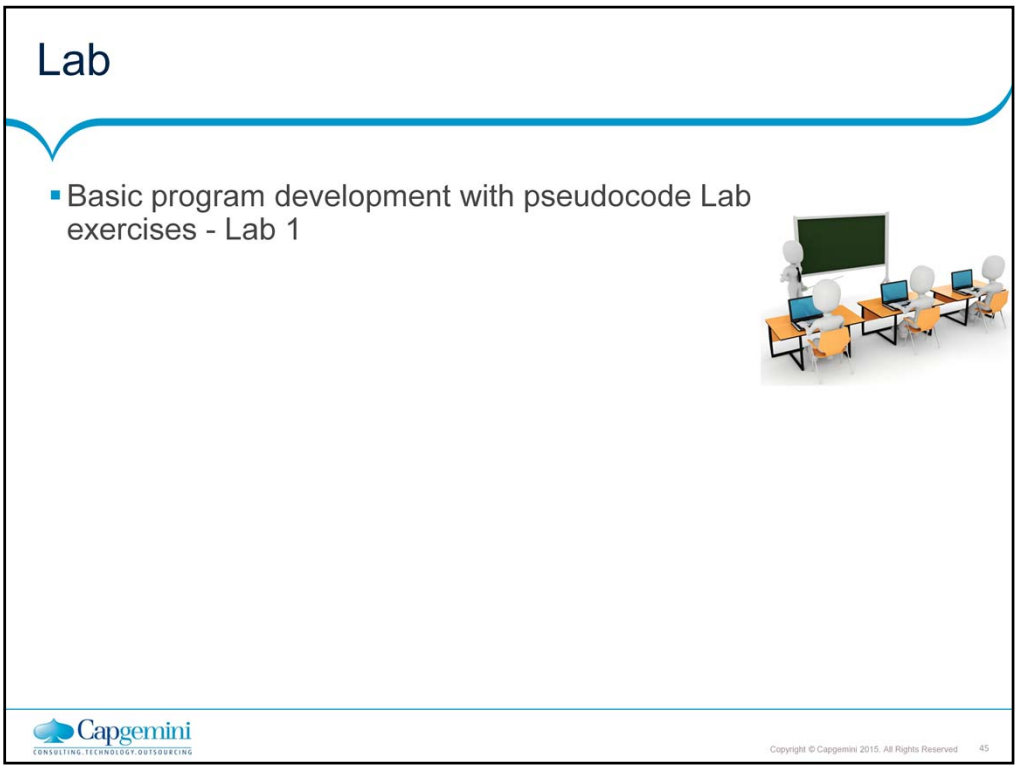
Operations on an array:

The frequent operations which we perform on an array are

- Searching: searching the array for particular element
- Sorting : arranging data in particular order (ascending/descending)



The above pseudocode logic is used to accept 10 numbers from user and find the largest number among 10 numbers. For storing the accepted 10 numbers of same type, array is used in this pseudocode.



Write pseudocode for all the assignments mentioned in Lab 1 for practicing on the usage of variables, operators, control constructs and arrays.

Summary

- In this lesson, you have learnt about:
  - Introduction to programs
  - What is a program?
  - What is an application?
  - Industry Vs College Programs
  - Types of projects
  - SDLC process of waterfall model
  - Introduction to Algorithm and Pseudocode
  - Usage of variables, datatypes and constants
  - Introduction to control constructs

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Review Question

- Question 1: What are different types of testing techniques?
  - A. Self testing
  - B. Black box testing
  - C. Red box testing
  - D. None of the above

- Question 2: A task which gets done in the specified time with desired quality defines ------
  - A. Maintainable
  - B. Efficient
  - C. Robust
  - D. Readable

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Review Question

- Question 3: There is no absolute standard for pseudocode
  - A. True
  - B. False

- Question 4: Identify guidelines for using variables
  - A. Assigning values to variables just before values are used
  - B. Prefer local variables over global ones
  - C. Initialize variables used in looping constructs at the top of the code block
  - D. Maximize the lifetime of local variables

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Review Question

- Question 5: How does the following code breach best practice guidelines

```
myarray[10]= new Array{1,1,2,3,5,8,13,21,34,55};
index=0;
while(index<10)
index=index+1;
//dosomething
```

- A. The array should have a clearer name
- B. The index is never incremented
- C. The index Is zero based so the loop passes beyond the last element

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Review Question

- Question 6: Match the looping structure to their definitions

1. For	A. Condition controlled for executing choice once
2. IF	B. Condition controlled for executing choice multiple times
3. While	C. Count controlled

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Review Question

- Question 7: You need to create a loop whose exit condition depends solely on the maximum number of employees being reached when you increment the number of employees by one. Which construct should you choose to ensure greatest clarity
  - A. For
  - B. DO UNTIL
  - C. while

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