ST0523 Fundamentals of Programming

Topic 1a :

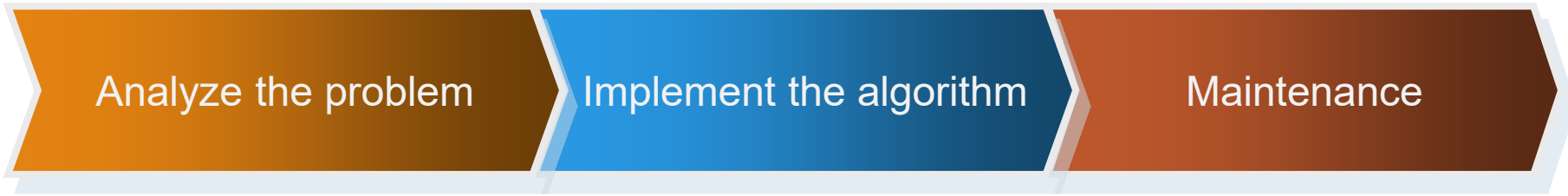
Problem Solving Skills

Problem Solving Skills

- To learn the stages in Problem Solving Process
- To specify the problem requirements

Problem Solving Process

- **Problem Solving Process**



- Outline the problem and its requirements
- Design steps (algorithm) to solve the problem

- Implement the algorithm
- Verify that the algorithm works

- Use and modify the program if the problem domain changes

Analyze the problem→ Outline the problem by:

- **Thoroughly understand the problem**
- **Understand problem requirements**
  - What are the inputs?
  - What are the outputs?
- **If the problem is complex, divide it into sub-problems**
  - Analyze each sub-problem as above

Class Activity

Think of a problem…

What are the input(s)?

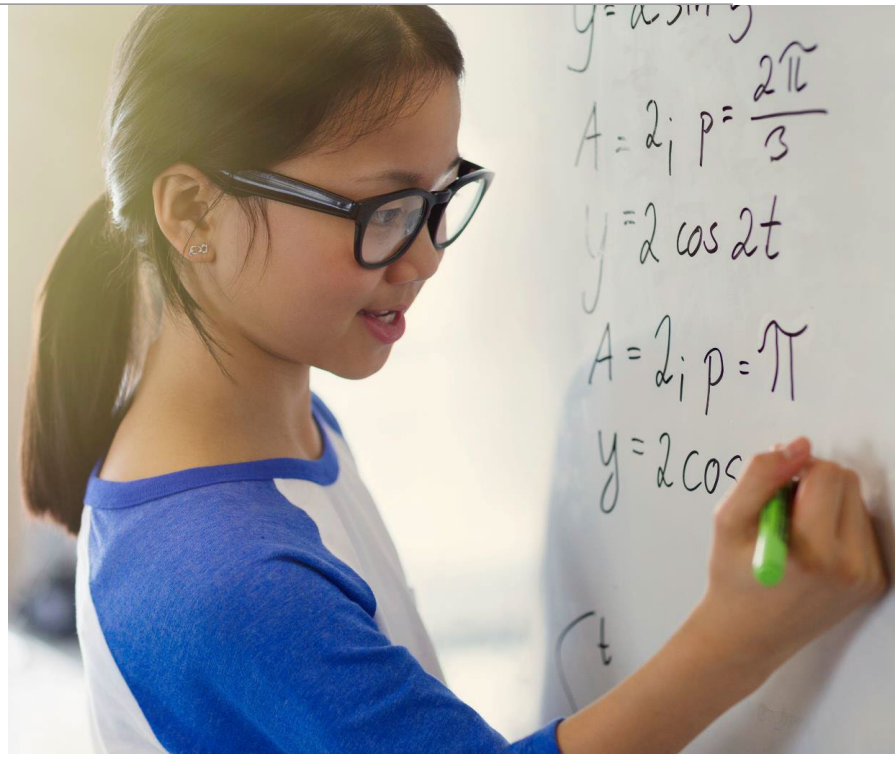
What are the output?

Example:

Problem is to find the water bill for this month.

Input : Amount of water used daily this month & rate per litre e.g $0.03/litre

Output: Cost of water bill this month

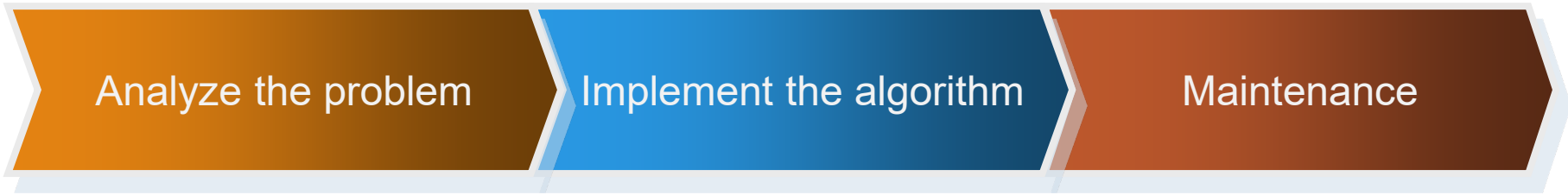


Recap!

What are the 3 stages of Problem Solving?

Problem Solving Process

- **Problem Solving Process**



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Test your understanding!

In stage 1 when we analyse a problem, what are the steps involved?

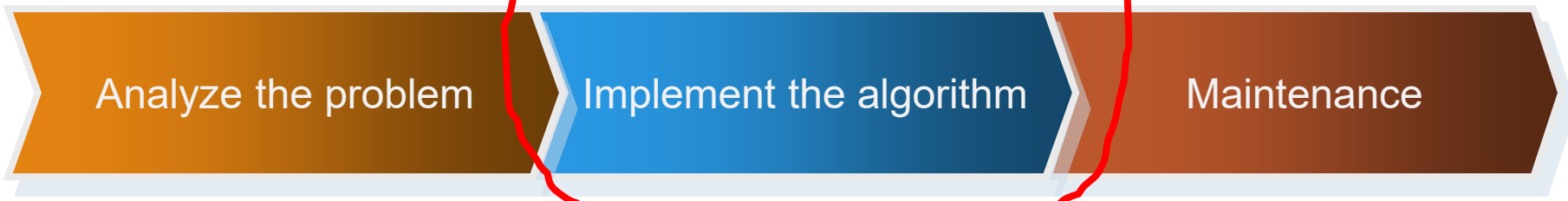
A. Use and modify the program if the problem domain changes
B. Outline the problem and its requirements
C. Verify that the algorithm works
D. Implement the algorithm
E. Design steps (algorithm) to solve the problem

Tutors may use ClassPoint or other tools to solicit students' respond.

Answers : B & E

Problem Solving Process

- **Problem Solving Process**



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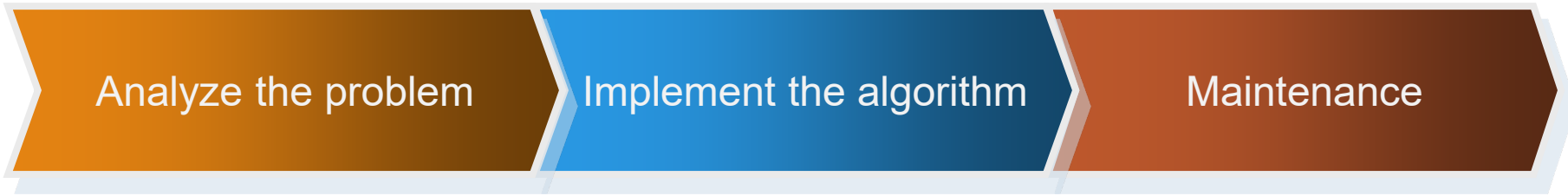
Implement the algorithm

- Before a computer can perform a task, it must have an algorithm that tells it what to do.
- Informally: “An algorithm is a set of steps that define how a task is performed.”
- Formally: “An algorithm is an ordered set of unambiguous executable steps, defining a terminating process.”
  - Ordered set of steps → it is structured
  - Executable steps → it can be executed
  - Unambiguous steps → there’s a direction to follow
  - Terminating → must have an end
- Algorithm can be represented many different ways like Flowchart or Pseudo-code
- Computer program code such as JavaScript, Java, C#, Visual Basic, Python, etc

Recap → Problem Solving Process

- **Problem Solving Process**



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- Use and modify the program if the problem domain changes

Test your understanding!

What are the 2 steps involved after analysing problems?

[Hint: Stage 2]

A. Use and modify the program if the problem domain changes
B. Outline the problem and its requirements
C. Verify that the algorithm works
D. Implement the algorithm
E. Design steps (algorithm) to solve the problem

Multiple Choice

Answers : C & D

Test your understanding!

Which of the following is/are TRUE of a flowchart?

A. Shows logic of an algorithm
B. Emphasizes individual steps and their interconnections
C. Control flow from one action to the next

Self-reading – 5 mins

Maintenance

- Maintenance is when you add new functionality or change existing functionality. This is often done long after the code was originally written and in a completely unforeseeable manner. Program codes must be flexible enough to allow such changes. This is called “Maintainable Program”.

- It is a good idea to provide as much information as possible to the next person who reads the code – even if that person is you.

- Consistency, in the form of conventions, gives lots of extra information.

Ask Questions using Chat

Program maintenance

E.g Naming convention of the files

TaxCal.js → TaxCal_v2_22 Apr 2020

Namelist.js →NameList_v2.js

Logbook of changes :

TaxCal.js last changed

1. 22 April by xxxxx

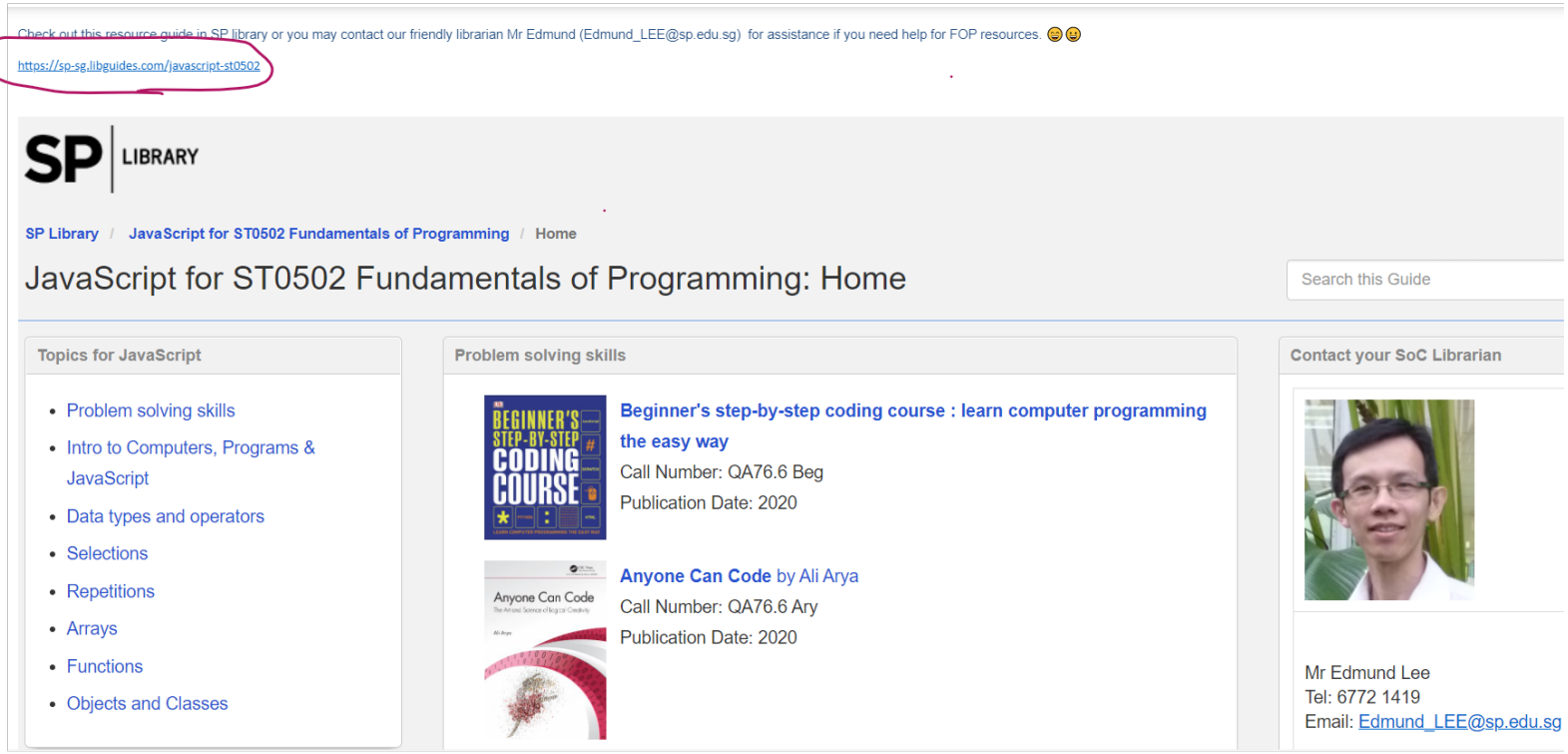
An example to ensure consistency

Test your understanding!

3. Finally in maintenance of program, which step(s) is/are involved? Choose your answer(s).

   A. Use and modify the program if the problem domain changes
   B. Outline the problem and its requirements
   C. Verify that the algorithm works
   D. Implement the algorithm
   E. Design steps (algorithm) to solve the problem

Additional curated resources from SP librarian, Edmund Lee (refer to eSP(BrightSpace) under Additional Resources



Summary : Problem Solving Skills

- To learn the stages in Problem Solving Process
- To specify the problem requirements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