

OCR Computer Science A Level

2.1.5 Thinking Concurrently

Advanced Notes



Specification

2.1.5 a)

- Determining where concurrent processing can be used

2.1.5 b)

- Benefits of concurrent processing
- Drawbacks of concurrent processing



Thinking Concurrently

Concurrent Thinking

Concurrent thinking is built upon the idea of **concurrent processing**. It is the process of completing **more than one task** at any given time. This doesn't necessarily mean that you have to be working on multiple tasks at once, which is the technique used by **multicore processors**. Concurrent processing means different tasks are given slices of processor time, to give the illusion that tasks are being performed simultaneously, and concurrent thinking is the mindset that allows you to spot patterns and parts of problems where concurrency can be applied. Below is an example illustrating this concept:

You are given two tasks:

- 1) Record the number plate of all the cars that pass you in a given time,
- 2) Record the colour of all the cars that pass you in a given time.

When tackling this problem, you could record every car's number plate, then go back and record every car's colour. However, the more sensible way of approaching this problem is to record the number plate of a single car and then record the colour of the same car, before moving on to the next car. This is an example of concurrent thinking.

When determining which parts of a problem can be solved at the same time, you must first assess which parts of the problem are related. Related sections of a problem can often be solved simultaneously, and therefore be dealt with concurrently.

Concurrent Processing

The key difference between **concurrent processing** and **concurrent thinking** is that concurrent processing uses a **computer processor** while concurrent thinking means using your **brain** rather than a computer.

People often confuse **concurrent processing** and **parallel processing** as being the same thing, but they are slightly different. Parallel processing is when **multiple processors** are used to complete more than one task simultaneously. In contrast, concurrent processing is when each task is given a **slice** of processor time to make it look like the tasks are being completed **simultaneously** when in reality they are executed sequentially.



Benefits and Drawbacks of Concurrent Processing

Benefits of concurrent processing

- The **number of tasks completed in a given time** is increased.
- **Less time is wasted waiting** for an input or user interaction, as other tasks can be completed.

Drawbacks of concurrent processing

- Concurrent processing can take longer to complete when large numbers of users or tasks are involved as processes cannot be completed at once.
- There is an **overhead in coordinating** and switching between processes, which reduces program throughput.
- Just as with parallel processing, not all tasks are suited to being broken up and performed concurrently.

