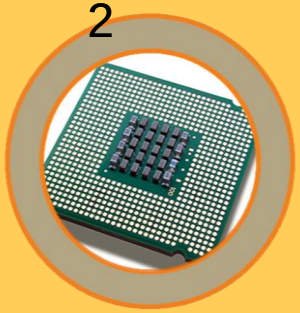
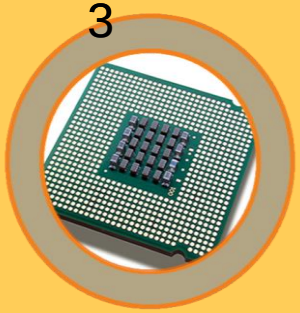
7.2: Methods for defining syntax



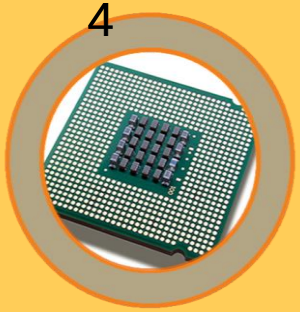
What this module is about

- In this module we discuss:
- explain how functions, procedures and their related variables may be used to develop a program in a structured way, using stepwise refinement;
- describe the use of parameters, local and global variables as standard programming techniques;
- explain how a stack is used to handle procedure calling and parameter passing;
- **explain the need for, and be able to create and apply, BNF (Backus-Naur form) and syntax diagrams;**
- explain the need for reverse Polish notation;
- convert between reverse Polish notation and infix form of algebraic expressions using trees and stacks.



BNF

- We have studied BNF already. Can you remember when and where?
- Clue: It was in year 13
- Look back and read through again.



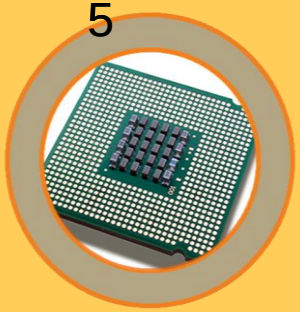
Syntax Diagrams

- A method of defining grammatical rules of a language or data type.
- Circle with text inside 

  - A terminal symbol. Item that is not defined in any more detail because the item described is self-evident.

- Rectangle with text inside 

  - Item is defined in greater detain in another syntax diagram. Basically, there will be another syntax diagram describing how this works in more detail.

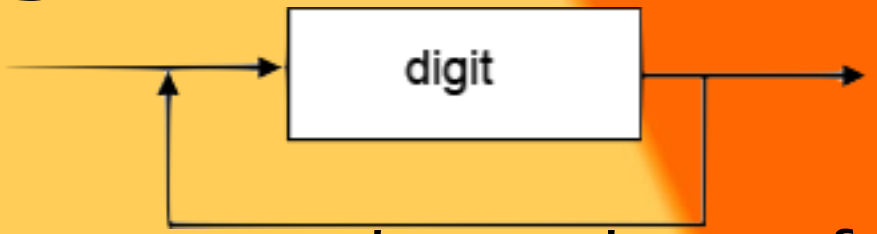


Syntax Diagrams

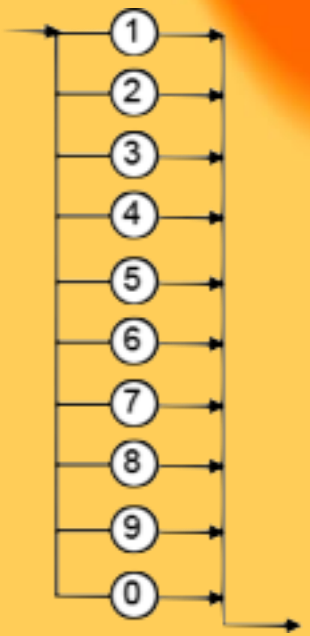
- Arrow
  - Indicates the direction in which you read the diagram.

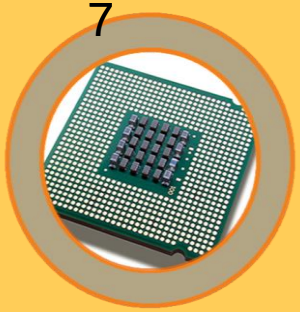
  - To show iteration, arrows can loop back.

Syntax Diagram Example



- Defining an integer
  - This indicates that an integer can be made up of one or more digits. Digit is in a rectangle so needs defining.
- Defining Digit
  - The arrows point to parallel terminals
  - Only a single path can be taken at once
  - Parallel symbols act like 'OR'
  - The BNF notation would be:
    - digit:== 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0





Syntax Diagram Example

- Defining a Stock Code
  - You are writing a database to handle stock. The primary key is Stock Code. Define the data structure for stock code using syntax diagrams
  - Valid stock code: A:A1JZ2B
  - Only the letters A, B, J and Z can be used
  - Can you attempt without looking at the next slide?
  - Dont cheat Louise!

Syntax Diagram Example

- The top diagram ensures that one of the ‘alpha’ items comes first, followed by the ‘:’ character, and then the last six characters will be made up of either ‘alpha’ or ‘digit’ items