KESTEVEN AND SLEAFORD HIGH SCHOOL

Computer Science Scheme of Learning

Year 11 – Term 1

Intent – Rationale

This term introduces students to the Von Neumann architecture and its Fetch Decode Execute cycle, the role of primary and secondary storage and the key performance indicators: clock speed, cores and cache.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 9 Term 2	• A-Level Computer Science chapter 10 (Y12 and Y13 Term 3)

What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
• N/A	• N/A

What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
• Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers by Jim Ledin	• Calculating and comparing CPU performance indicators

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Year 11 – Term 1

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- **Architecture of the CPU:** the purpose of the CPU, the fetch-execute cycle, common components and their function (ALU (arithmetic logic unit), cu (control unit), cache, registers), von Neumann architecture: MAR, MDR, register, program counter, accumulator
- **CPU performance:** how common characteristics of CPUs affect their performance: clock speed, cache size and number of cores
- **Embedded systems:** the purpose and characteristics of embedded systems and examples of embedded systems
- **Primary storage (memory):** the need for primary storage, the difference between RAM and ROM, the purpose of ROM in a computer system, the purpose of RAM in a computer system, virtual memory
- **Secondary storage:** the need for secondary storage, common types of storage (optical, magnetic, solid state), suitable storage devices and storage media for a given application, the advantages and disadvantages of different storage devices and storage media relating to these characteristics: capacity, speed, portability durability, reliability, cost

Apply

- Be able to describe: what actions occur at each stage of the fetch-execute cycle, the role/purpose of each component and what it manages, stores, or controls during the fetch-execute cycle, the purpose of each register, what it stores (data or address) and the difference between storing data and an address
- Be able to describe the effects of changing any of the common characteristics on system performance, either individually or in combination
- Be able to describe what embedded systems are, typical characteristics of embedded systems and identify a range of common embedded systems
- Be able describe why computers have primary storage, how this usually consists of ram and ROM, key characteristics of ram and ROM, why virtual memory may be needed in a system, how virtual memory works and the transfer of data between ram and HDD when ram is filled and its impact on performance
- Be able to describe why computers have secondary storage, recognise a range of secondary storage devices/media, differences between each type of storage device/medium, compare advantages/disadvantages for each storage device and be able to apply their knowledge in context within scenarios

Extend

- Understand how optical and magnetic storage devices physically operate

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What subject specific language will be used and developed in this topic?		What opportunities are available for assessing the progress of students?

• **Architecture:**
   o Fetch
   o Decode
   o Execute,
   o Components
   o Cache
   o Register
   o Bus
   o Address
   o Data
   o Von Neumann
   o Accumulator
• **CPU performance:**
   o Characteristics
   o Clock speed,
   o Hertz
   o Cache
   o Cores (dual, quad, octo)
	• **Storage:**
	   o Primary
	   o Secondary
	   o Read only memory
	   o Random access memory
	   o Volatile
	   o Optical
	   o Magnetic
	   o Solid state
	   o Virtual memory
	   o Swap file
	   o Thrashing
		• Class notes and in-lesson observation
		• Kahoot starters/plenaries and verbal questioning
		• Formal assessment in term 2

Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
			See P drive for lesson presentations/resources