Unit: Computer Architecture

Lesson_02 Cache Memory

Lesson Title: The role of cache memory

IB Syllabus Alignment: Lesson 2.1.3 - The student will be able to explain the use of cache memory.

SWBAT/IB Teaching Standard for Assessment: Students should be able to explain the effect of cache memory in speeding up the system as well as being able to explain how it is used.

Do Now/Coding Component (2 minutes) Students select one of the three code blocks below (Fortran code) and attempt to interpret the code. They will then be asked to find an equivalent code block written in C, Java, Python, Scratch or any other language they prefer.

IF (L) THEN
    N=N+1
        CALL CALC
    ELSE
        K=K+1
        CALL DISP
    END IF
	IF (C .EQ. 'a') THEN
	    NA=NA+1
	        CALL APPEND
	    ELSE IF (C .EQ. 'b') THEN
	        NB=NB+1
	        CALL BEFORE
	    ELSE IF (C .EQ. 'c') THEN
	        NC=NC+1
	        CALL CENTER
	    END IF
		IF (PRESSURE .GT 1000.0) THEN
		    IF (N .LT. 0.0) THEN
		        X = 0.0
		        Y = 0.0
		    ELSE
		        Z = 0.0
		    END IF
		    ELSE IF (TEMPERATURE .GT. 547.0) THEN
		        Z = 1.0
		    ELSE
		        X = 1.0
		        Y = 1.0
		    END IF

Part A. Introducing the Lesson *(5 minutes) Teacher will discuss how the human brain uses a specific portion of the brain to process short-term information -*

Part B. Student Centered Activity. *(20 minutes)*

Group 1: Read the article [Techopedia:Cache Memory](https://www.techopedia.com/definition/6307/cache-memory)
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Group 2: Read the article [How can caching explain automaticity?](https://link.springer.com/article/10.3758/s13423-022-02191-0)
https://link.springer.com/article/10.3758/s13423-022-02191-0?utm_source=xmol&utm_medium=affiliate&utm_content=meta&utm_campaign=DDCN_1_GL01_metadata

Group 3: Read the article: [Caching for Beginners](https://www.geeksforgeeks.org/caching-system-design-concept-for-beginners/)

https://www.geeksforgeeks.org/caching-system-design-concept-for-beginners/

Group 4: Read the article: System Design Basics: Getting Started with Caching

https://towardsdatascience.com/system-design-basics-getting-started-with-caching-c2c3e934064a

Part C. Whole Group Lesson Component /Harkness Protocol _(15 minutes) Teacher will show this code to the class and students will be asked to describe what the code block is doing (or attempting to do) in the context of the cache._

Source: https://www.enjoyalgorithms.com/blog/caching-system-design-concept

 Part D: _(Optional) Supplemental Task (as time permits)_

Is caching important in gaming? https://www.pcguide.com/hdd/guide/hard-drive-cache/

Cache v. Ram: What is the difference between the two?