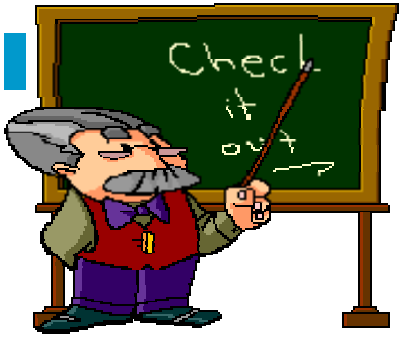
Ten Simple Steps of an I/O on System z



1. The user program begins an I/O operation by issuing an OPEN (macro) instruction and requesting either input or output of data using an I/O macro instruction like GET, PUT, READ, or WRITE, and specifying a target I/O device. An I/O macro instruction invokes an access method that interprets the I/O request and determines which system resources are needed to satisfy the request. The user program could bypass the access method, but it would then need to consider many details of the I/O operation, such as the physical characteristics of the device. The program would also have to create a channel program composed of instructions for the channel subsystem, and invoke the EXCP processor, an IOS driver, to handle the next phase of the I/O process. By using an access method, a user program maintains device independence.

2. There are several z access methods, each of which offers different functions to the user program. The selection of an access method depends on how the program plans to access the data (randomly, or sequentially, for example) and the data set organization (sequential, PDS, VSAM, etc.).

3. To request the movement of data, either the access method or the user program presents information about the operation to the processor by issuing the EXCP macro instruction. EXCP translates the information (CCW Command Chain Addresses and CCW Data Addresses) into a format acceptable to the channel subsystem, fixes the pages containing the CCWs and the data buffers, validity-checks the extents, and invokes the I/O Supervisor (IOS). Media Manager (represented by an MM in the diagram) is the I/O driver of the VSAM access method. NOTE: IMS and DB2 uses the Media Manager under covers.

4. If there are no pending I/O operations for the required device (from this system),IOS places the request for I/O on the queue for the chosen I/O device in the UCB* and issues the Start Subchannel (SSCH) instruction to send the request to the channel subsystem. At this point, the central processor can continue with other work until the channel subsystem indicates, with an I/O interrupt, that the I/O operation has completed.

5. One of the System Assist Processors (SAP) processes the SSCH instruction and selects a channel path to initiate the I/O operation. This channel executes the channel program, controlling the movement of data between device, control unit, and processor storage.

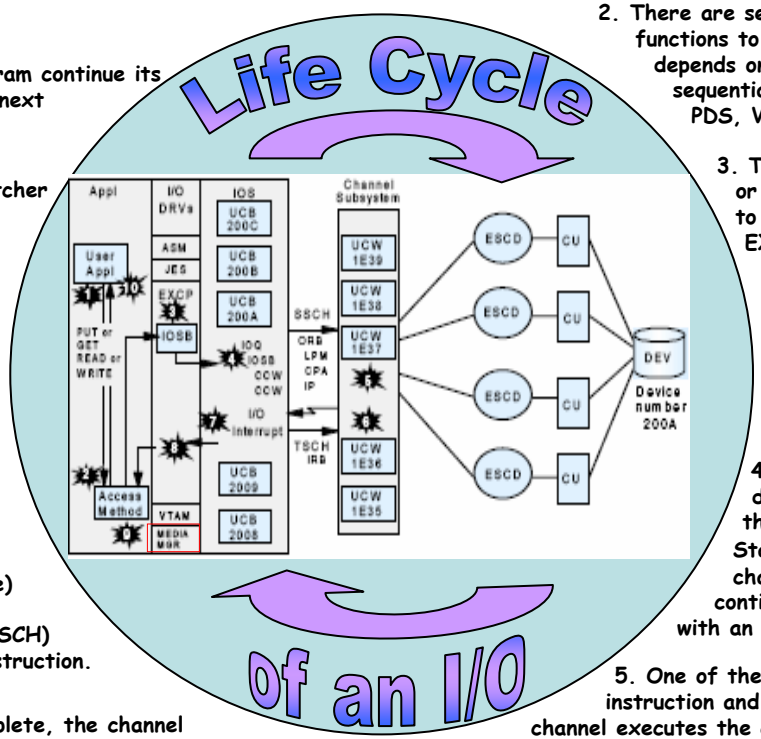
6. When the I/O operation is complete, the channel subsystem signals completion by generating an I/O interrupt.

7. IOS processes the interruption by determining the status of the I/O operation (successful or otherwise) from the channel subsystem using a Test Subchannel (TSCH) instruction.

8. EXCP indicates that I/O is complete by posting the access method and calling the dispatcher.

9. When appropriate, the dispatcher reactivates the access method. The access method returns control to the user program (through a branch).

10. The user program continue its processing at its next instruction point.



* EXCP: Execute Channel Pgm.
* Every accessible device has a Unit Control Block (UCB)

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