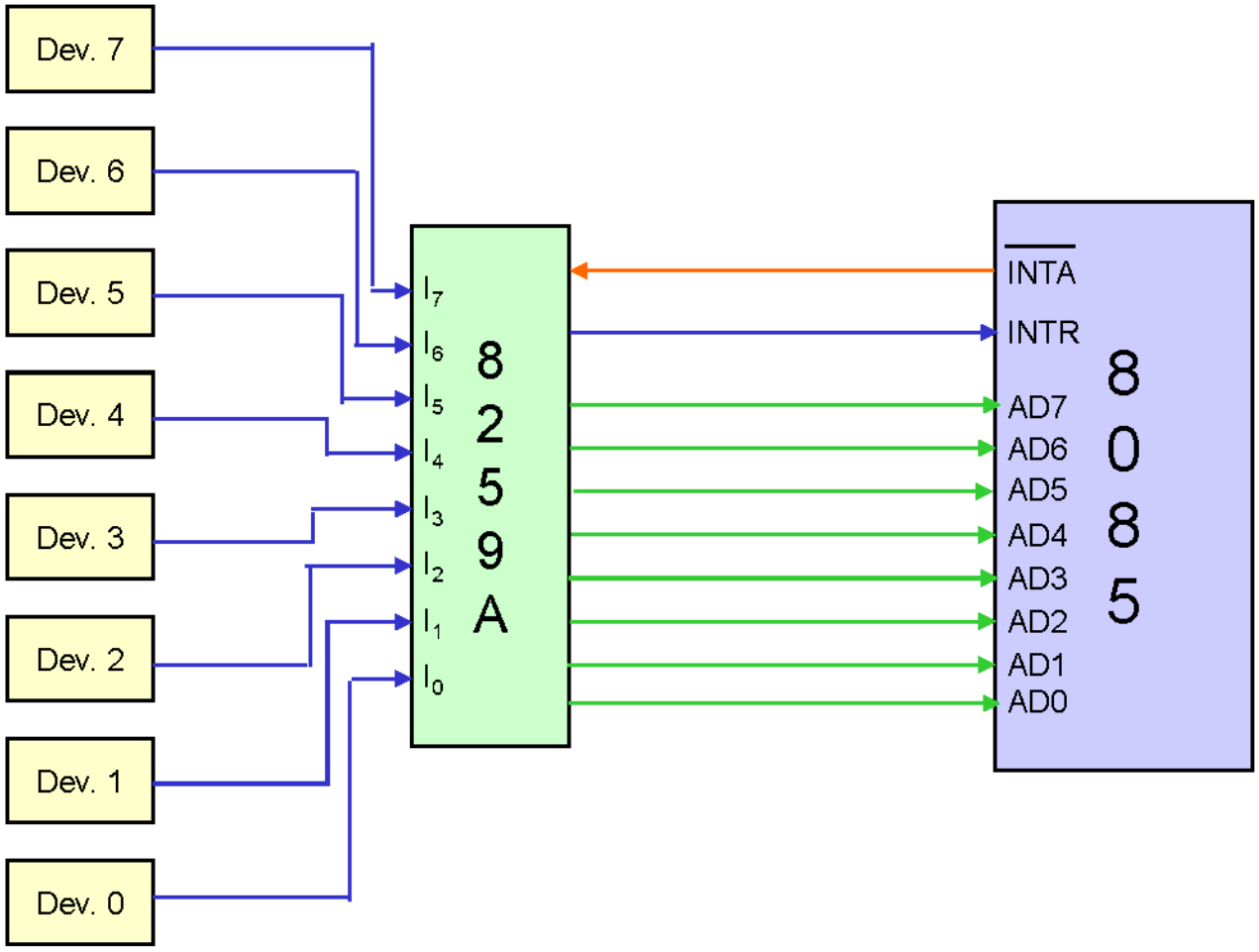
Programmable Interrupt Controller 8259A LECTURE 3

The Need for the 8259A

- The 8085 INTR interrupt scheme presented earlier has a few limitations:
  - The RST instructions are all vectored to memory page 00H, which is usually used for ROM.
  - It requires additional hardware to produce the RST instruction opcodes.
  - Priorities are set by hardware.
- Therefore, we need a device like the 8259A to expand the priority scheme and allow mapping to pages other than 00H.

Interfacing the 8259A to the 8085



Operating of the 8259A

- The 8259A requires the microprocessor to provide 2 control words to set up its operation. After that, the following sequence occurs:
  1. One or more interrupts come in.
  2. The 8259A resolves the interrupt priorities based on its internal settings
  3. The 8259A sends an INTR signal to the microprocessor.
  4. The microprocessor responds with an INTA signal and turns off the interrupt enable flip flop.
  5. The 8259A responds by placing the op-code for the CALL instruction (CDH) on the data bus.

Operating of the 8259A

6. When the microprocessor receives the op-code for CALL instead of RST, it recognizes that the device will be sending 16 more bits for the address.
7. The microprocessor sends a second INTA signal.
8. The 8259A sends the high order byte of the ISR's address.
9. The microprocessor sends a third INTA signal.
10. The 8259A sends the low order byte of the ISR's address.
11. The microprocessor executes the CALL instruction and jumps to the ISR.

Direct Memory Access

- This is a process where data is transferred between two peripherals directly without the involvement of the microprocessor.
  - This process employs the HOLD pin on the microprocessor
    - The external DMA controller sends a signal on the HOLD pin to the microprocessor.
    - The microprocessor completes the current operation and sends a signal on HLDA and stops using the buses.
    - Once the DMA controller is done, it turns off the HOLD signal and the microprocessor takes back control of the buses.