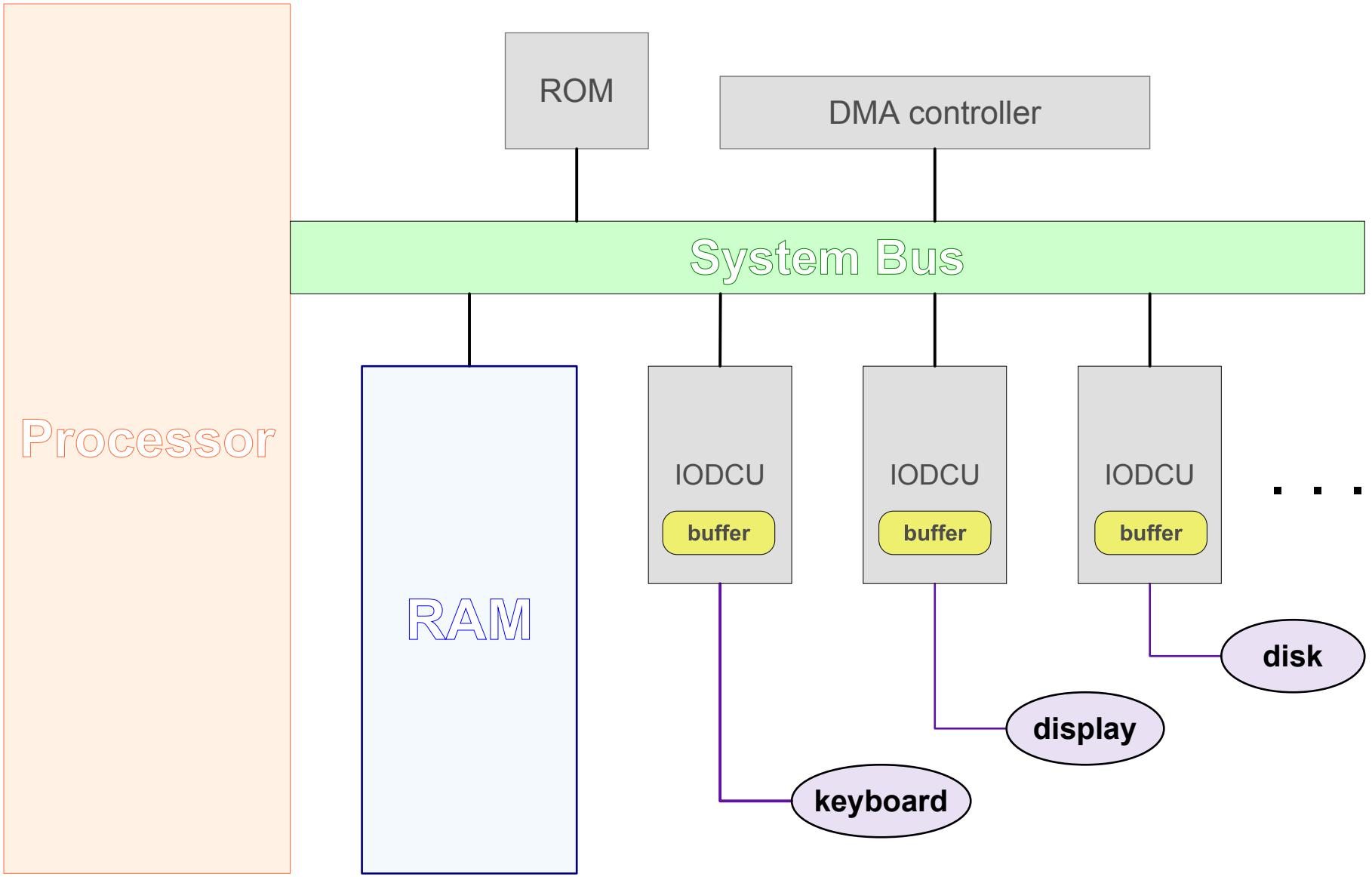
HW 1: Computer Components

In two or three sentences of your own words define, describe, or discuss the following components of the TOY computer:

1. The System Bus
2. ROM Memory
3. RAM Memory
4. IODCU
5. IODCU buffer
6. The Processor
7. The DMA Controller

The **TOY** Computer



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The System Bus

Connects the different components of the computer. (Logically, three separate buses for addresses, data, and control.)

ROM Memory

Read **O**nly **M**emory — *non-volatile* memory provided by the computer manufacturer. Contains instructions and data that allows the processor to start up when power is turned on.

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RAM Memory

R**andom **A**ccess **M**emory* — ***Main Memory, *volatile* memory containing both data and instructions for running program(s).

Comprises a sequence of individually addressable units (bytes or words) of data that can be read or written by the processor. (A word consists of multiple bytes. A *byte* consists of eight bits. Each *bit* can be either 0 or 1.)

Connects to the system bus through a ***M**emory **A**ddress **R**egister* (**MAR**) and a ***M**emory **D**ata **R**egister* (**MDR**)

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IODCU

I*nput/****O****utput* ***D****evice* ***C****ontrol* ***U****nit* — *Device Controller*, an *interface* between a computer system and its input/output device. Translated information coming from the device into a form the system can use and *vice versa*. ***Interrupts*** *the processor when a task is finished.*

IODCU Buffer

A chunk of RAM memory that provides a way station for data on its way from the device to the system and *vice versa*. Compensates for the speed mismatch between the system (extremely fast) and the device (relatively slow).

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The Processor (CPU)

Fetches instructions from main memory and executes them. User instruction execution may entail loading data from memory, performing operations (addition, etc.) on data, or storing data.

Privileged instructions**,** executed only by the computer's operating system (often in response to interrupts from device controllers), choreograph the flow of data among the components of the computer over the system bus.

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DMA controller

***D**irect **M**emory **A**ccess* **controller** — takes over from the processor the task of orchestrating the movement of large chunks of data between main memory and I/O device controller units.