

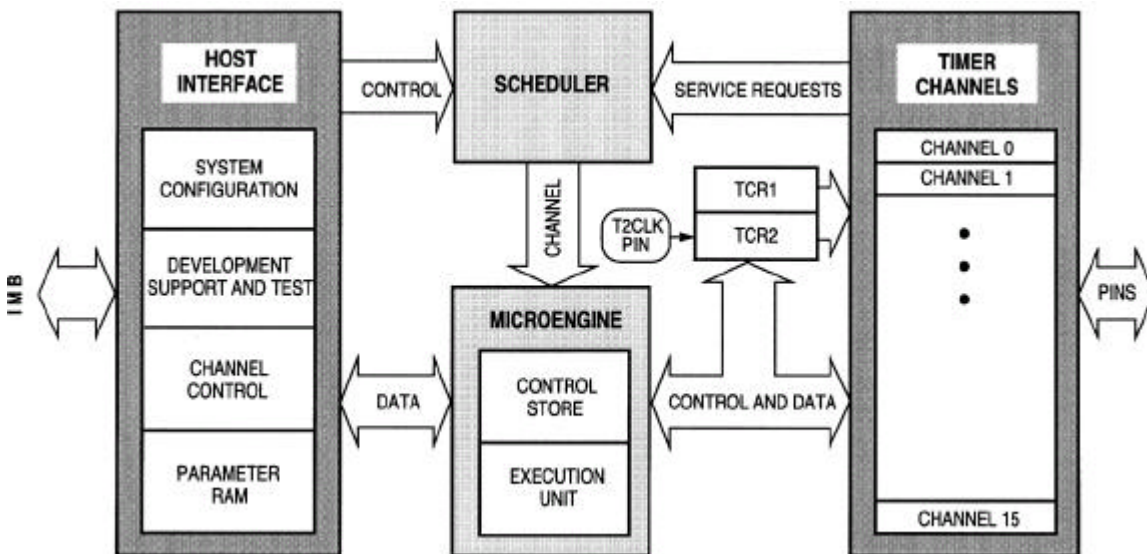
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You may discuss these questions with your classmates, as it may be helpful to gain a good understanding of the topic. Nonetheless you should always submit your own work! Use a word processor to answer these questions, attach this questions page to your answers.

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**Question 1.**

Depict the simplified TPU architecture we discussed in class, show how the modules interact with each other. Explain the purpose of the microengine and the scheduler.



The microengine is in charge of executing instructions within the TPU. It contains a ROM and a microprogrammed execution unit. The control store ROM stores the microcode for the predefined TPU channel functions. User-defined functions can be executed from TPURAM.

The scheduler receives service requests from the channels, and handles those requests based on the channel number and the assigned TPU priority. It interacts with the microengine for the proper execution of instructions after receiving a service request.

**Question 2.**

List the parameters that are used for control of TPU channel functions.

For each of the 16 TPU channels there are:

- Four bits in the Channel Function Select Register
- Two bits in the Channel Priority Register

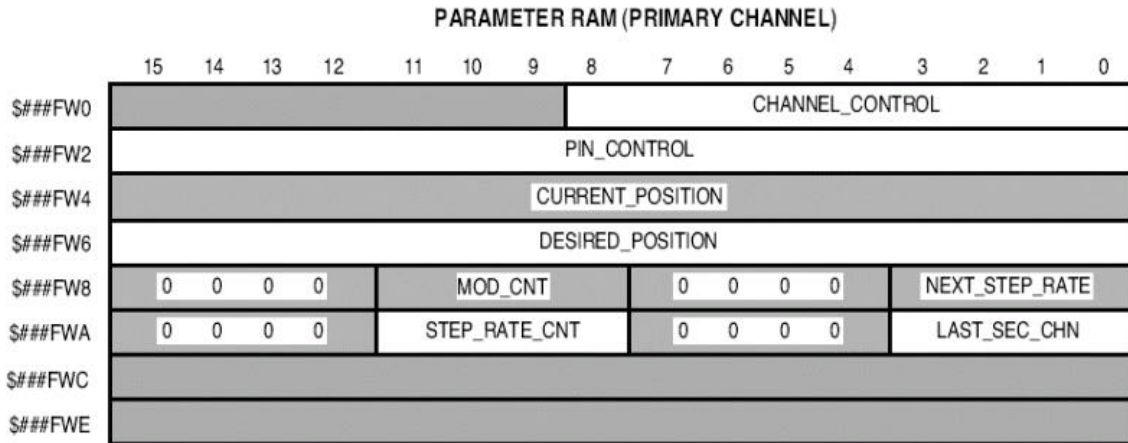
- Two bits in the Host Sequence Register
- Two bits in the Host Service Request Register
- One bit in the Interrupt Enable Register
- One bit in the Interrupt Status Register
- Six (or eight) words in the two-port Parameter RAM

Question 3.

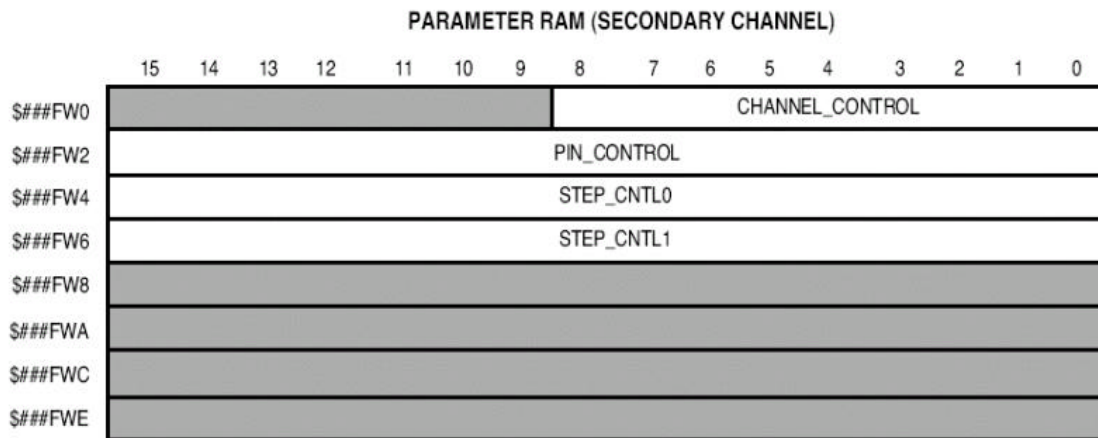
Assume the TPU is used to control a stepper motor.

- Depict the parameters for the primary channel in the two-port parameter RAM.
- Depict the parameters for the secondary channels in the two-port parameter RAM.

a)



b)



Question 4.

What is the main advantage of using pull-up resistors in a Bus connection?

*We have access to unlimited amounts of current; hence we can drive many signals through the Bus without any loss of information.*

Question 5.

What are the four main issues to take into consideration when designing high-speed circuits?

- 1. Time delays due to interconnecting wires.*
- 2. The possibility of distorted waveforms due to “ringing” and uncontrolled “reflections” on signal lines.*
- 3. The possibility of “crosstalk” between adjacent signal lines.*
- 4. The possibility of electrical noise generation and electrical signal pick-up.*