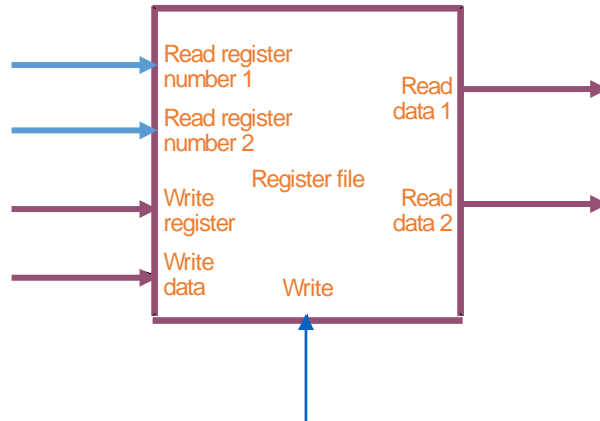


First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_

- Using Verilog, design a register file for the block diagram depicted in the figure below. The register file has 16 registers, each register 8-bit long. Your register file should allow reading of any two registers and writing to a single one.



- The computing industry has not improved quite as rapidly as the transportation industry.
  - True
  - False
- The agricultural and industrial revolutions each transformed society. Computers have led to a relatively recent information revolution.
  - True
  - False
- Computer improvements have led to previously undreamt applications like cell phones, but most signs suggest the improvements are now coming to an end.
  - True
  - False

Indicate to which class each computing application belongs.

- A home computer kept on a desktop and used by family members for emails, web browsing, social networking, and movie watching.
  - Embedded
  - PC
  - Server

6. A computer in an Amazon building accessed by thousands of people for online shopping.
  - Embedded
  - PC
  - Server
  
7. A computer in a cardiac pacemaker, which delivers electric shocks to keep a human's heart beating properly.
  - Embedded
  - PC
  - Server
  
8. A computer at a federal laboratory that continually executes sophisticated algorithms on massive amounts of data from various weather stations to develop accurate weather forecasts.
  - Embedded
  - PC
  - Server
  
9. "PostPC" era refers to today's situation of today's most widely-used computers being things other than PCs.
  - True
  - False
  
10. The number of PCs sold annually continues to increase at a dramatic rate.
  - True
  - False
  
11. A smart phone isn't actually a computer.
  - True
  - False
  
12. Cloud computing often involves thousands of servers in giant warehouses.
  - True
  - False
  
13. Software as a Service refers to installing large software applications on a PC, such as Microsoft Office.
  - True
  - False

14. In 2012, about 600 million smart phones were sold.
- True
  - False
15. Today's programmers of PCs and servers emphasize improving program performance by using a minimal amount of memory.
- True
  - False
16. Today's programmers also emphasize energy efficiency of programs.
- True
  - False
17. The performance of a program depends on many things, like the original program, how the program is translated to a computer's language, and the hardware.
- True
  - False
18. A multicore microprocessor is a single processor capable of switching between multiple programs.
- True
  - False
19. Acronyms are rarely used in the field of computers.
- True
  - False

20. Match the situation with the closest analog of a great idea in computer architecture.

- **Make the Common Case Fast**
- **Hierarchy of Memories**
- **Design for Moore's Law**
- **Use Abstraction to Simplify Design**

- a. A soccer player runs not to where the ball is, but to where the ball will be.
- b. A customer talks to a phone agent. If there's a problem, he talks to the agent's supervisor.
- c. A house architect first designs a house with 5 rooms, then designs room details like closets, windows, and flooring.
- d. A college student rents an apartment closer to campus than to her favorite weekend beach spot.

21. Match the situation with the closest analog of a great idea in computer architecture.

- **Performance via Prediction**
- **Performance via Parallelism**
- **Performance via Pipelining**
- **Dependability via Redundancy**

- a. A sister is hanging clothes to dry. Her brother helps by hanging clothes simultaneously.
- b. A brother is washing and drying dishes. His sister helps by drying each dish immediately after the brother washes each.
- c. A mom expects her son will be hungry after a long airplane flight, so she cooks dinner just in case. If he's not hungry, she'll whip up a dessert instead.
- d. A drummer's stick breaks, but he quickly grabs another one and continues playing the song.

22. Behind a car's simple items like steering wheel, gas pedal, and brake pedal are complex mechanical/computerized details. Those simple items represent \_\_\_\_\_.  
 abstraction  
 an operating system  
 Linux
23. The physical machinery on which software runs.  
 Instructions  
 Hardware  
 Compiler
24. Software that manages hardware resources on behalf of other programs.  
 Hardware  
 Compiler  
 Operating system
25. A program to play tic-tac-toe.  
 Systems software  
 Application software
26. The collection of software on a computer that provides services to application software.  
 Systems software  
 Compiler
27. "Bit" is short for "binary digit."  
 True  
 False
28. Binary refers to  $10^{-1}$ .  
 True  
 False
29. Computers use binary because binary is more powerful than decimal numbers.  
 True  
 False

30. Although binary's alphabet contains only two "letters", 0 and 1, the binary alphabet can represent as much information as the English alphabet's 26 letters.
- True
  - False
31. The number 12 can be represented in binary as 1100. If a computer's memory location contains 00001100, then that location contains the number 12.
- True
  - False
32. The following could be a machine-language instruction: 1000110010100000.
- True
  - False
33. The following could be an assembly language instruction: 1000110010100000.
- True
  - False
34. An assembler translates assembly language instructions like *add A,B* to machine-language instructions like 1000110010100000.
- True
  - False
35. Which is a high-level language instruction?
- 000000001010001000000000100011000
  - `add $2, $4, $2`
  - `temp = v[k];`
36. What kind of language is C?
- Machine
  - Assembly
  - High-level
37. An advantage of a high-level language is allowing a programmer to \_\_\_\_\_.
- think more naturally
  - think like a machine

38. An advantage of a high-level language is enabling a programmer to \_\_\_\_\_.

- change a program
- implement a program in less time

39. An advantage of a high-level language is that a program \_\_\_\_\_.

- is specific to a particular machine
- is independent of a particular machine

40. The five components of a computer.

- **Control**
- **Input**
- **Memory**
- **Output**
- **Datapath**

- a. Writes data to memory. Ex: Keyboard.
- b. Reads data from memory. Ex: Display.
- c. Stores instructions and data.
- d. Sends signals that determine the operation of the other components.
- e. Performs computations.

41. A liquid crystal display works by having the liquid crystal generate different colors of light.

- True
- False

42. A typical computer display is made up of hundreds of pixels.

- True
- False

43. An active matrix display is an LCD that uses a transistor to control whether light passes for each pixel.

- True
- False

44. Each pixel of a display typically involves 24 bits, with 8 bits for each of red, blue, and green.
- True
  - False
45. A frame buffer stores the pixel values for a display.
- True
  - False
46. A touchscreen combines a display for output with a touch-sensitive screen for input.
- True
  - False
47. An integrated circuit is often called a \_\_\_\_\_.
- chip
  - CPU
48. The CPU chip physically occupies \_\_\_\_\_ of the size of the iPad 2.
- most
  - a small fraction
49. The iPad 2 consists of how many chips?
- 1
  - 2
  - 5
50. The A5 package has a chip containing \_\_\_\_\_ ARM processors.
- 1
  - 2
  - 5
51. A CPU is also known as \_\_\_\_\_.
- a datapath
  - control
  - a processor



52. RAM and cache.

- **DRAM**
- **Cache**
- **SRAM**

- a. Large memory where most data is stored.
- b. A faster memory technology than DRAM, but using more area to store a bit.
- c. A small memory that keeps a copy of data from larger memory.

53. An instruction set architecture enables a machine language program to run on different hardware implementations.

- True
- False

54. While different hardware implementations may run the same program, designers strive to keep the performance of new hardware implementations the same as older implementations.

- True
- False

55. Memories.

- **Nonvolatile memory**
- **Volatile memory**
- **Flash memory**
- **Secondary memory**
- **Magnetic disk**
- **Main memory**

- a. Memory layer used to hold programs and data while programs are running.
- b. Memory layer used to store programs and data between runs.
- c. A form of memory that retains data only if the memory is receiving power.
- d. A form of memory that retains data in the absence of a power.

- 8. A nonvolatile semiconductor memory often used as secondary memory for personal mobile devices.
- e. A form of nonvolatile secondary memory composed of rotating platters coated with a magnetic recording material

56. \_\_\_\_\_ memory is volatile.

- DRAM
- Flash
- Disk

57. \_\_\_\_\_ memory is the most expensive per GB.

- DRAM
- Flash
- Disk

58. \_\_\_\_\_ memory has the longest access time.

- DRAM
- Flash
- Disk