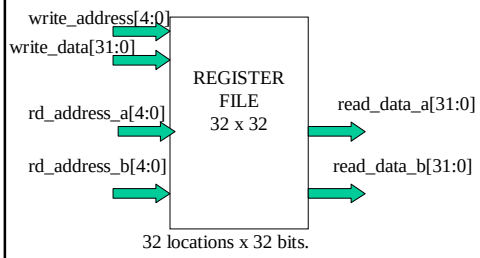
Register file normally has 1 write port + 2 read ports.

Why? add r2, r4, r5 is r2 = r4 + r5.

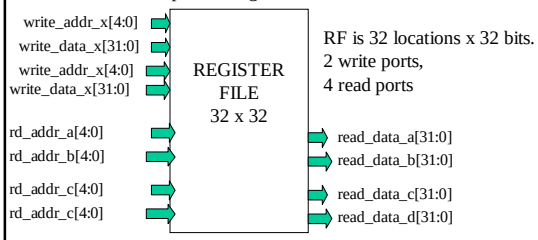


32 locations x 32 bits.

Can be reading writing one operand while reading two others...

1/21/01

Can we add more ports to register file? Yes...



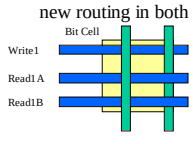
RF is 32 locations x 32 bits.
2 write ports,
4 read ports

Why add more ports?
If I want to execute MORE THAN one instruction per clock need to fetch 2 read operands for each instruction, complete a write for each instruction operand.

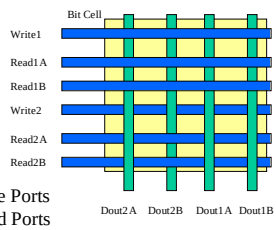
1/21/01

Multi-Ported Register File Design has Limits

- Area of the register file grows approximately with the square of the number of ports
  - ⇒Typically routing limited, each new port requires adding new routing in both X and Y direction



1 write Port
2 Read Ports



2 write Ports
4 Read Ports

1/21/01

Multiported Register Files (cont)

- Read Access time of a register file grows approximately linearly with the number of ports
  - ⇒Internal Bit Cell loading becomes larger
  - ⇒Larger area of register file causes longer wire delays
- What is reasonable today in terms of number of ports?
  - ⇒Changes with technology, 15-20 ports is currently about the maximum (read ports + write ports)
  - ⇒Will support 5-7 execution units simultaneous operand accesses from register file

1/21/01