**Register Files**

Accessing one of several registers is:

* OK if just a few registers
* Problematic when many
* Ex: Earlier above-mirror display, with 16 registers
  + Much fanout (branching of wire): Weakens signal
  + Many wires: Congestion

Diagram

Description automatically generated

Diagram, schematic

Description automatically generated

Data (9) is decreasing step by step.

MxN register file: Efficient design for one-at-a-time write/read of many registers (M register, N bit data)

* Consider 16x32-bit registers (16 registers, bit size: 32)

You can use these registers for different datas. One part can hold a data, other part can hold another data.

Graphical user interface, application, Word

Description automatically generated with medium confidence

Internal design uses drivers and bus

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated

three-state driver has the same purpose with driver 🡪 strength the data

In three-state driver, if c is 0, it behaves like open circuit

**Register-File Example: Above-Mirror Display**

16 32-bit registers that can be written by car’s computer, and displayed

* Use 16x32 register file
* Simple, elegant design

Register file hides complexity internally

* because only one register needs to be written and/or read at a time, internal design is simple

Diagram

Description automatically generated

NEW design

Diagram, schematic

Description automatically generated

**Example: Find the greatest common divider of A and B**

//Inputs:  
 byte a, b;  
 bit go;

//Outputs  
 byte gcd;  
 bit done;

while (1){

while(!go);

done = 0;

while (a != b){

if (a > b) a = a - b;

else b = b - a;

}

gcd = a;

done = 1;

}

local registers: regA and regB

Text

Description automatically generated with medium confidenceDiagram

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A picture containing text

Description automatically generated



Design the datapath:

- 2 local registers to hold the data:

* regA
* regB

- Comparator

- 2 substractors

Diagram

Description automatically generatedSadece go 1’ken (döngünün başında) new\_data\_ld 1 olur ki yeni gelen veriler yüklensin.

Diagram

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