

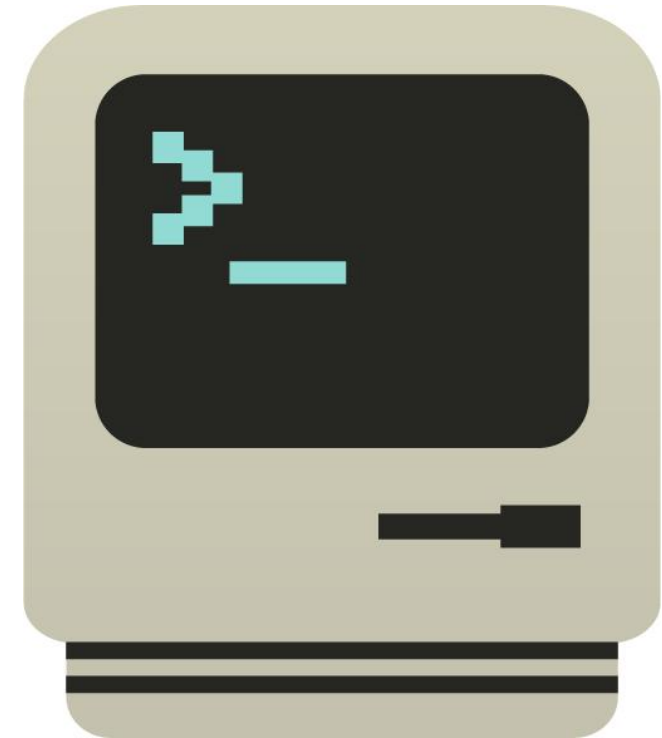
Project 3

MIPS Simulator



<Maoqin Zhu> for ECE 510

Instructor: Yadi Eslami



Introduction

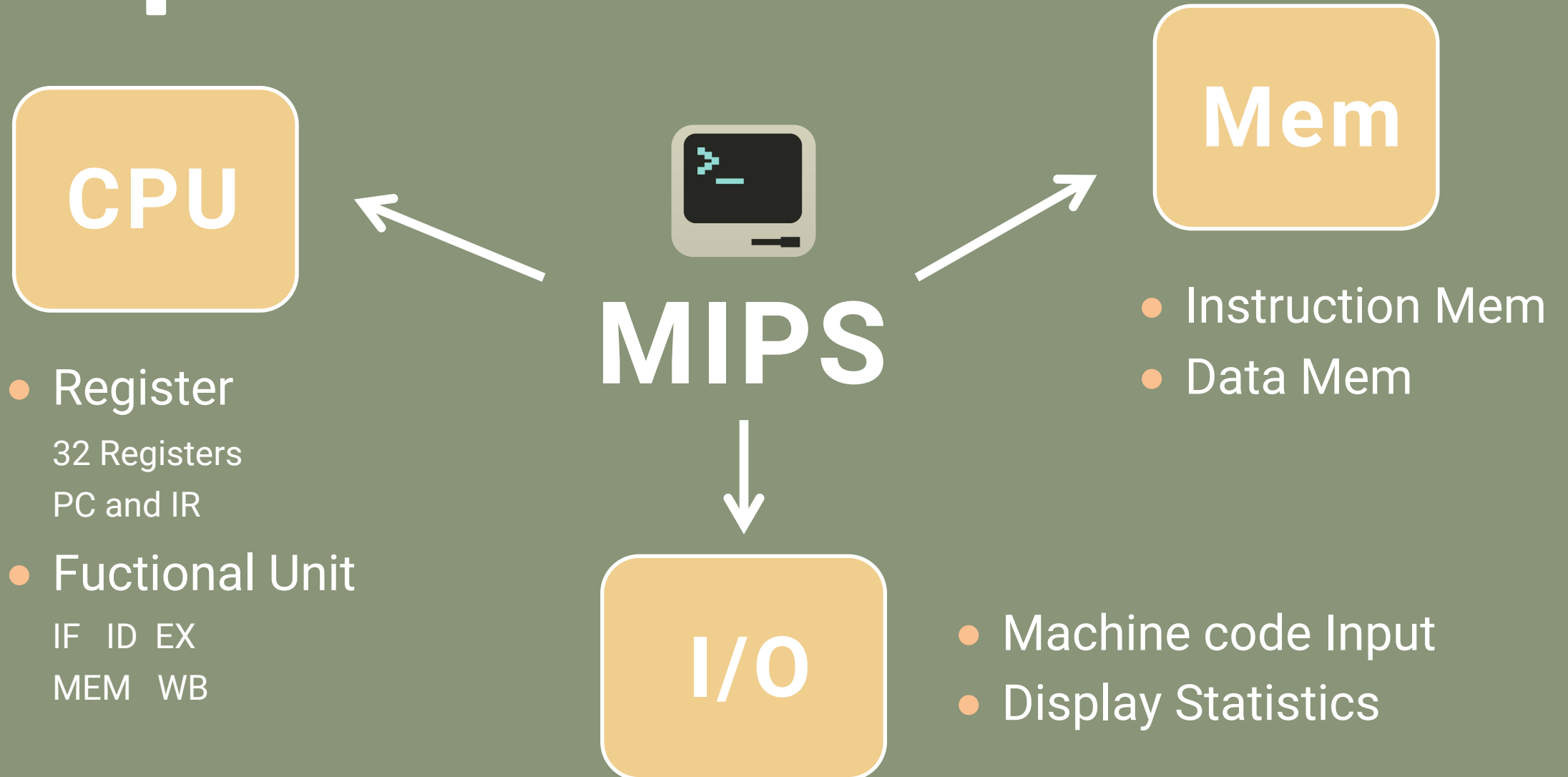
Components

Parallel
Execution

Hazards Analysis

Live Demo

Components



Components

```
Class cpu{
```



Cpu.h



```
public:
```

```
    Registers[]; // 32 Regs, IR, PC  
    Control unit; // 8 control signals  
    Latch value; // for 4 pipeline regs  
    Other flag signals; // for each stage
```

```
    int FuctionUnit(); // 5 funcs for 5 stages  
    int hazard_check(); // at ID stage  
    void EX_ALU(data1, data2, ALUOp);
```

```
}
```

CPU



Cpu.cpp



Cpu_unit.cpp



Cpu_IF.cpp



Cpu_ID.cpp



Cpu_EX.cpp



Cpu_MEM.cpp



Cpu_WB.cpp

Components

Mem

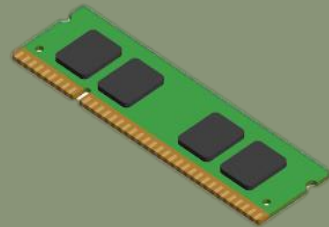


Memory.h



Memory.cpp

```
Class Memory{  
public:  
    int Mem[]; // IMem and DMem  
    void loadMem();  
    void showMem();  
    void intMem();  
    void charMem();  
}
```



I/O



code.txt



MipsDemo.cpp

```
#include <fstream>
```



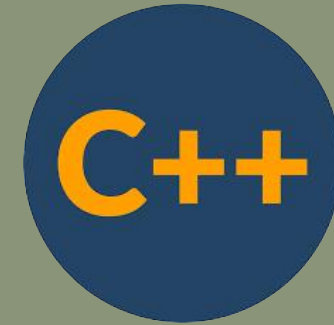
How to increase
CPU Throughput?



Consider
Pipelining



Parallel Execution in



MipsDemo.cpp

```
while(current<input){  
    object.WB();  
    object.MEM();  
    object.EX();  
    object.hazard_check;  
    object.ID();  
    object.IF();  
}
```

In Specific
Order!

Hazard Analysis

```
op <- binary2int(IR,31,26)

if (op=4) {    // beq
    .....    //deal with
}              branch
```

Control Hazard



hazard
check();

Data Hazard

```
rs <- binary2int(IR,25,21)
rt <- binary2int(IR,20,16)

if ( regBusy[rs] or
    regBusy[rt] ) {
    .....
}
```

Hazards must be taken into account and be resolved



Cpu_ID.cpp

```
hazard_check() {  
  nop <- 0;  
  if (hazards) {nop<-1}  
}
```

if (!nop)



ID();

IF();



“NOP”



be inserted to ask
IF/ID to stop and wait

Live Demo !





THANK YOU!

Maxy Zhu

UMass Amherst



Maoqinzhu@umass.edu



www.linkedin.com/in/maoqin-zhu