

Organisasi dan Arsitektur Komputer

Pertemuan 5 : Control Unit

CONTROL UNIT

- ▶ Bagian dari komputer yang menggenerasi signal yang mengontrol operasi komputer.
- ▶ Tugas Control Unit adalah mengontrol sisklus Mesin Von Neumann

Kebutuhan Fungsional

- ▶ Mendefinisikan elemen dasar prosesor
- ▶ Mendiskripsikan operasi mikro yang harus dilakukan prosesor
- ▶ Menentukan fungsi Control Unit yang harus dilakukan prosesor

Micro-Operations

- ▶ A computer executes a program
- ▶ Fetch/execute cycle
- ▶ Each cycle has a number of steps
 - see pipelining
- ▶ Called micro-operations
- ▶ Each step does very little
- ▶ Atomic operation of CPU

Constituent Elements of Program Execution

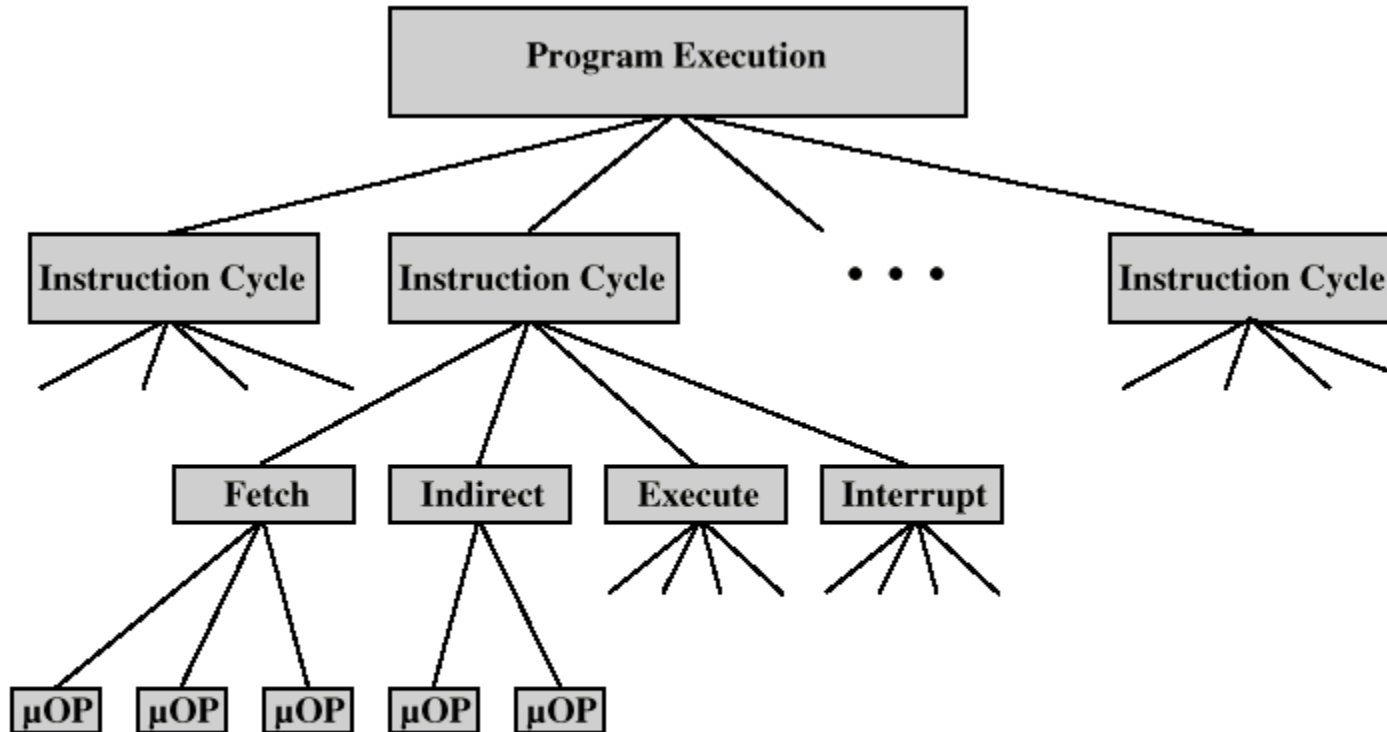
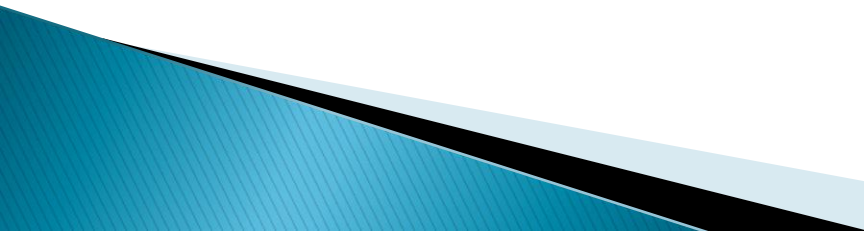


Figure 14.1 Constituent Elements of a Program Execution

Fetch - 4 Registers

- ▶ **Memory Address Register (MAR)**
 - Connected to address bus
 - Menetapkan alamat word di memori untuk dibaca atau ditulis
- ▶ **Memory Buffer Register (MBR)**
 - Connected to data bus
 - Menyimpan data untuk ditulis atau untuk menerima word dari memori
- ▶ **Program Counter (PC)**
 - Menyimpan alamat pasangan instruksi berikutnya
- ▶ **Instruction Register (IR)**
 - Menyimpan instruksi opcode yang sedang dieksekusi

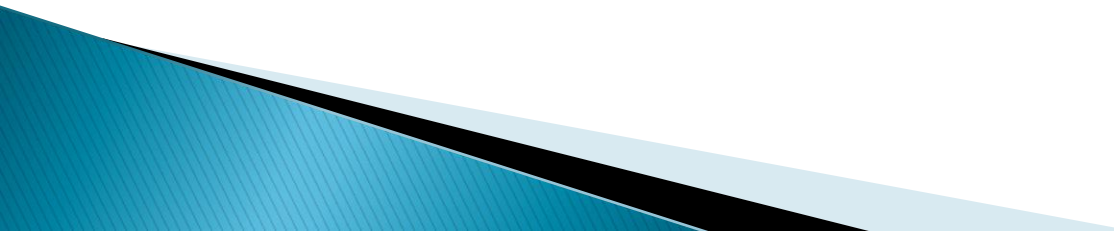
Fetch Sequence

- ▶ Address of next instruction is in PC
 - ▶ Address (MAR) is placed on address bus
 - ▶ Control unit issues READ command
 - ▶ Result (data from memory) appears on data bus
 - ▶ Data from data bus copied into MBR
 - ▶ PC incremented by 1 (in parallel with data fetch from memory)
 - ▶ Data (instruction) moved from MBR to IR
 - ▶ MBR is now free for further data fetches
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Fetch Sequence (symbolic)

- $t1: MAR \leftarrow (PC)$
- $t2: MBR \leftarrow (\text{memory})$
- $PC \leftarrow (PC) + 1$
- $t3: IR \leftarrow (MBR)$
- (tx = time unit/clock cycle)
- or
- $t1: MAR \leftarrow (PC)$
- $t2: MBR \leftarrow (\text{memory})$
- $t3: PC \leftarrow (PC) + 1$
- $IR \leftarrow (MBR)$

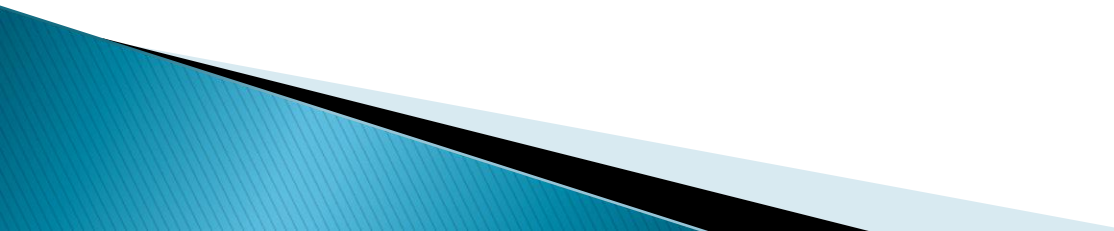
Elemen Dasar Prosesor

- ALU
 - Register
 - Internal Data Path
 - External Data Path
 - Control Unit
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Tipe Operasi Mikro

- Mendefinisikan elemen dasar prosesor
- Mendiskripsikan operasi mikro yang harus dilakukan prosesor
- Menentukan fungsi Control Unit yang harus dilakukan prosesor

JENIS SINYAL KONTROL

- Clock
 - Instruction Register
 - Tags
 - PadaBUS Kendali
 - PadaOuputdalamCPU
 - MelaluiBUS Kendali
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FUNGSI CONTROL UNIT :

1. Sequencing (mengurutkan operasi)
2. Mengeksekusi

JENIS CONTROL UNIT :

1. Control Unit Microprogrammed
 - Control Vertikal
 - Control Horizontal
 2. Control Unit Konvensional/Hard-Wired
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KOMPONEN-KOMPONEN POKOK CONTROL

UNIT MICROPROGRAMMED :

1. Instruction Register
 2. Control Store berisi micro programmed
 3. Address Computing Circuiting
 4. Micro programmed Counter
 5. Micro instruction Buffer
 6. Micro instruction Decoder
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