

* IR register (16 bit)

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| --- | --- | --- | --- |
| Op code  (2 bits) | Func  (3 bits) | Rsrc  (3 bits) | Rdst  (bits) |

* F/D Buffer

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| --- |
| IR 1 |
| IR2 |

* Control unit (for each instruction)

instruction alu (4 bit)

MR(1 bits)

Rdst (3 bit)

Wb (1 bit)

* Alu Control

|  |  |
| --- | --- |
| **combination** | **F =** |
| 0000 | No op |
| 0001 | Set carry (one op) |
| 0010 | Clear carry (one op) |
| 0011 | Not (one op) |
| 0100 | Increment (one op ) |
| 0101 | Decrement (one op) |
| 0110 | Rdst (one op ) |
| 0111 | Add |
| 1000 | Sub |
| 1001 | And |
| 1010 | Or |
| 1011 | Shift left |
| 1100 | Shift right |

* Regestir File

RSrc(3 bit) Rsrc (16 bit)

Rdst (3 bit) Rdst (16 bit)

Data(M/w) Rdst(M/W)

(16 bit ) (3 bit)

* D/E Buffer

|  |
| --- |
| Rdst (3 bit ) |
| Rsrc (3 bit ) |
| Branch taken (1 bit) |
| Load use (1 bit) |
| Rsrc data (16 bit) |
| Rdst data (16 bit ) |
| WB (1 bit ) |
| Memory read (1 bit) |
| Memory write (1 bit) |
| Alu op (4 bit ) |

* E/M

|  |
| --- |
| Rdst (3 bit ) |
| Wb (1 bit) |
| Memory read (1 bit ) |
| Memory write (1 bit) |
| Alu result (16 bit) |

* M/W

|  |
| --- |
| Rdst (3 bits) |
| Wb (1 bit) |
| Memory read (1 bit) mux select |
| Alu result (16 bit) |
| Memory result (16 bit) |

* Taken from d/e buffer to hazard detection
* Immediate