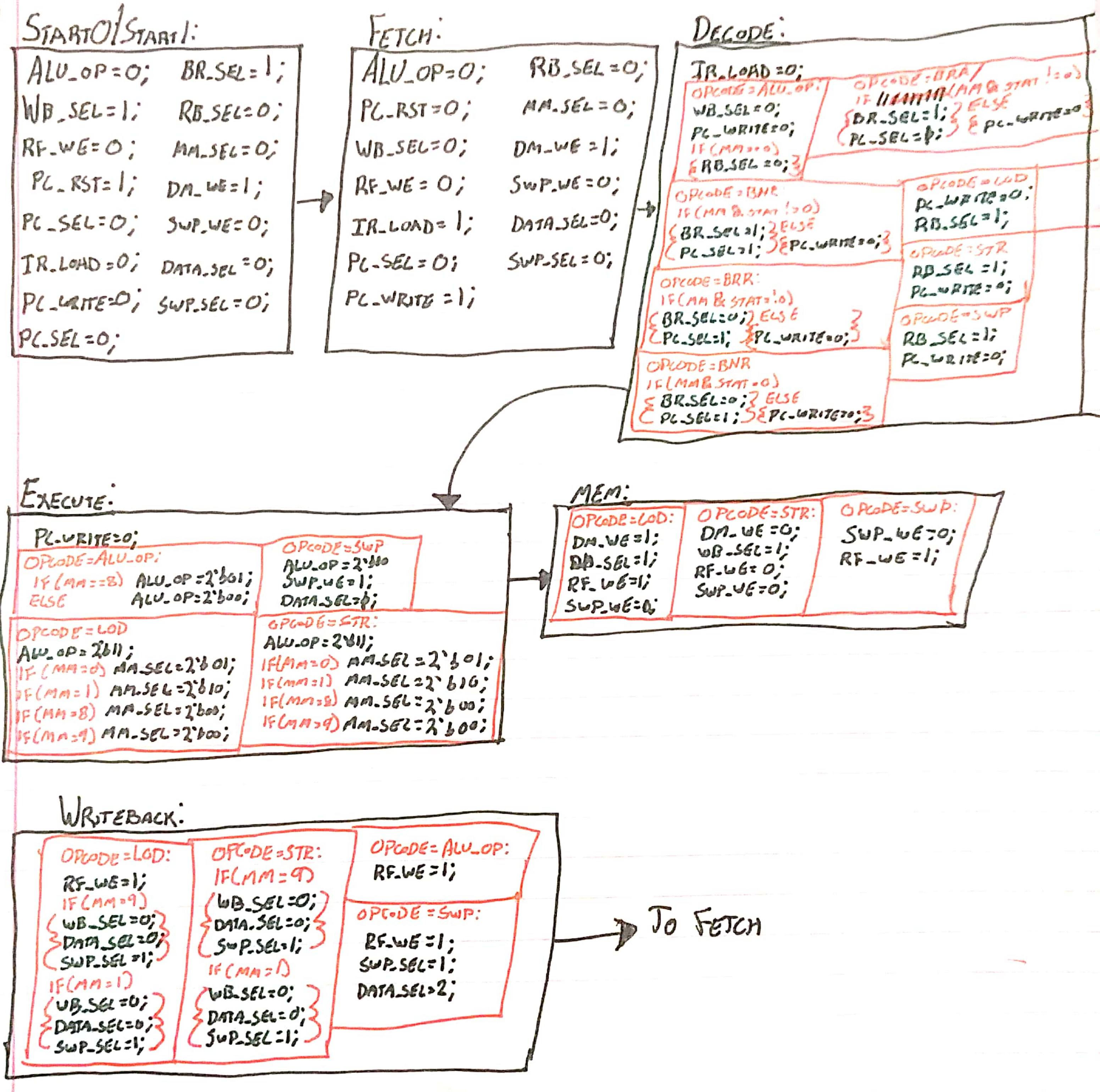

START0/START1:

```
ALU_OP=0;      BR_SEL=1;
WB_SEL=1;      RB_SEL=0;
RF_WE=0;       MM_SEL=0;
PC_RST=1;      DM_WE=1;
PC_SEL=0;      SWP_WE=0;
IR_LOAD=0;     DATA_SEL=0;
PC_WRITE=0;    SWP_SEL=0;
PC_SEL=0;
```

FETCH:

```
ALU_OP=0;      RB_SEL=0;
PC_RST=0;      MM_SEL=0;
WB_SEL=0;      DM_WE=1;
RF_WE=0;       SWP_WE=0;
IR_LOAD=1;     DATA_SEL=0;
PC_SEL=0;      SWP_SEL=0;
PC_WRITE=1;
```

DECODE:

```
IR_LOAD=0;
OPCODE=ALU_OP:
WB_SEL=0;
PC_WRITE=0;
IF(MM==0)
{RB_SEL=0;}

OPCODE=BRA/
IF (MM & STAT !=0)
{BR_SEL=1;
 PL_SEL=0;} ELSE {PC_WRITE=0}

OPCODE=BNE
IF(MM & STAT !=0)
{BR_SEL=1;
 PC_SEL=1;} ELSE {PC_WRITE=0;}

OPCODE=BRR:
IF(MM & STAT=!0)
{BR_SEL=0;
 PC_SEL=1;} ELSE {PC_WRITE=0;}

OPCODE=BNR
IF(MM & STAT=0)
{BR_SEL=0;
 PC_SEL=1;} ELSE {PC_WRITE=0;}

OPCODE=LOD
PC_WRITE=0;
RB_SEL=1;

OPCODE=STR
RB_SEL=1;
PC_WRITE=0;

OPCODE=SWP
RB_SEL=1;
PC_WRITE=0;
```

EXECUTE:

```
PC_WRITE=0;
OPCODE=ALU_OP:
IF (MM==8)  ALU_OP=2'b01;
ELSE        ALU_OP=2'b00;

OPCODE=SWP
ALU_OP=2'b10
SWP_WE=1;
DATA_SEL=0;

OPCODE=LOD
ALU_OP=2'b11;
IF (MM=0) MM_SEL=2'b01;
IF (MM=1) MM_SEL=2'b10;
IF (MM=8) MM_SEL=2'b00;
IF (MM=9) MM_SEL=2'b00;

OPCODE=STR:
ALU_OP=2'b11;
IF(MM=0) MM_SEL=2'b01;
IF(MM=1) MM_SEL=2'b10;
IF(MM=8) MM_SEL=2'b00;
IF(MM=9) MM_SEL=2'b00;
```

MEM:

```
OPCODE=LOD:
DM_WE=1;
DB_SEL=1;
RF_WE=1;
SWP_WE=0;

OPCODE=STR:
DM_WE=0;
WB_SEL=1;
RF_WE=0;
SWP_WE=0;

OPCODE=SWP:
SWP_WE=0;
RF_WE=1;
```

WRITEBACK:

```
OPCODE=LOD:
RF_WE=1;
IF(MM=9)
{WB_SEL=0;
 DATA_SEL=0;
 SWP_SEL=1;}
IF(MM=1)
{WB_SEL=0;
 DATA_SEL=0;
 SWP_SEL=1;}

OPCODE=STR:
IF(MM=9)
{WB_SEL=0;
 DATA_SEL=0;
 SWP_SEL=1;}
IF(MM=1)
{WB_SEL=0;
 DATA_SEL=0;
 SWP_SEL=1;}

OPCODE=ALU_OP:
RF_WE=1;

OPCODE=SWP:
RF_WE=1;
SWP_SEL=1;
DATA_SEL=2;
```

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