|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Stage | **Opq rA, rB** | **rrmovq rA, rB** | **irmovq V, rB** | **rmmovq rA, D(rB)** | **mrmovq D(rB), rA** |
| Fetch | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valP ← PC + 2 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valP ← PC + 2 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valC ← M8[PC+2]  valP ← PC + 10 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valC ← M8[PC+2]  valP ← PC + 10 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valC ← M8[PC+2]  valP ← PC + 10 |
| Decode | valA ← R[rA]  valB ← R[rB]  dstE ← rB | valA ← R[rA]  dstE ← rB | srcA ← F  srcB ← F  dstE ← rB  dstM ← F | valA ← R[rA]  valB ← R[rB] | valB ← R[rB]  dstM ← rA |
| Execute | valE ← valB OP valA  setCC | valE ← 0 + valA | valE ← 0 + valC | valE ← valB + valC | valE ← valB + valC |
| Memory |  |  |  | M8[valE] ← valA | valM ← M8[valE] |
| Write Back | R[dstE] ← valE | R[dstE] ← valE | R[dstE] ← valE |  | R[dstM] ← valM |
| PC Update | PC ← valP | PC ← valP | PC ← valP | PC ← valP | PC ← valP |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Stage | **jXX Dest** | **call Dest** | **ret** | **pushq rA** | **popq rA** | **cmovXX rA, rB** |
| F | icode: ifun ← M1[PC]  valC ← M8[PC+1]  valP ← PC + 9 | icode: ifun ← M1[PC]  valC ← M8[PC+1]  valP ← PC + 9 | icode: ifun ← M1[PC]  valP ← PC + 1 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valP ← PC + 2 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valP ← PC + 2 | icode: ifun ← M1[PC]  rA: rB ← M1[PC+1]  valP ← PC + 2 |
| D |  | valB ← R[%rsp]  srcB ← %rsp  dstE ← %rsp | valA ← R[%rsp]  valB ← R[%rsp]  dstE ← %rsp | valA ← R[rA]  valB ← R[%rsp]  dstE ← %rsp | valA ← R[%rsp]  valB ← R[%rsp]  dstM ← rA | valA ← R[rA]  dstE ← rB |
| E | Cnd ← Cond(CC, ifun) | valE ← valB + (-8) | valE ← valB + 8 | valE ← valB + (-8) | valE ← valB + 8 | valE ← 0 + valA  Cnd ← Cond(CC, ifun) |
| M |  | M8[valE] ← valP | valM ← M8[valA] | M8[valE] ← valA | valM ← M8[valA] |  |
| W |  | R[dstE] ← valE | R[%rsp] ← valE | R[dstE] ← valE | R[%rsp] ← valE  R[dstM] ← valM | If (Cnd) R[dstE] ← valE |
| P | PC ← Cnd? valC: valP | PC ← valC | PC ← valM | PC ← valP | PC ← valP | PC ← valP |