|           |                       | OP<br>rA, rB        | rrmov/cmovXX<br>rA, rB | irmov<br>V, rB        | rmmov<br>rA, D(rB)    | mrmov<br>D(rB), rA    | jXX<br>Dest           | call<br>Dest          | push<br>rA          | ret                   | pop<br>rA             | iadd<br>V, rB         | leave                 |
|-----------|-----------------------|---------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|           |                       |                     |                        |                       |                       |                       |                       |                       |                     |                       |                       |                       |                       |
| Fetch     | icode:ifun            | M <sub>1</sub> [PC] | M <sub>1</sub> [PC]    | M₁[PC]                | M₁[PC]                | M₁[PC]                | M <sub>1</sub> [PC]   | M₁[PC]                | M <sub>1</sub> [PC] | M <sub>1</sub> [PC]   | M₁[PC]                | M <sub>1</sub> [PC]   | M <sub>1</sub> [PC]   |
|           | rA:rB                 | M₁[PC+1]            | M₁[PC+1]               | M₁[PC+1]              | M₁[PC+1]              | M₁[PC+1]              |                       |                       | M₁[PC+1]            |                       | M₁[PC+1]              | M <sub>1</sub> [PC+1] |                       |
|           | valC                  |                     |                        | M <sub>8</sub> [PC+2] |                     |                       |                       | M <sub>8</sub> [PC+2] |                       |
|           | valP                  | PC+2                | PC+2                   | PC+10                 | PC+10                 | PC+10                 | PC+9                  | PC+9                  | PC+2                | PC+1                  | PC+2                  | PC+10                 | PC+1                  |
| Decode    | valA                  | R[rA]               | R[rA]                  |                       | R[rA]                 | R[rA]                 |                       |                       | R[rA]               | R[%rsp]               | R[%rsp]               |                       | R[%rbp]               |
|           | valB                  | R[rB]               |                        |                       | R[rB]                 | R[rB]                 |                       | R[%rsp]               | R[%rsp]             | R[%rsp]               | R[%rsp]               | R[rB]                 | R[%rbp]               |
| Execute   | valE                  | valB OP valA        |                        | 0+valC                | valB+valC             | valB+valC             |                       | valB+(-8)             | valB+(-8)           | valB+8                | valB+8                | valB+valC             | valB+8                |
|           | cnd                   |                     | Cond(CC, ifun)         |                       |                       |                       | Cond(CC, ifun)        |                       |                     |                       |                       |                       |                       |
| Memory    | M <sub>8</sub> [valE] |                     |                        |                       | valA                  |                       |                       | valP                  | valA                |                       |                       |                       |                       |
|           | valM                  |                     |                        |                       |                       | M <sub>8</sub> [valE] |                       |                       |                     | M <sub>8</sub> [valA] | M <sub>8</sub> [valA] |                       | M <sub>8</sub> [valA] |
| Writeback | R[%rsp]               |                     |                        |                       |                       |                       |                       | valE                  | valE                | valE                  | valE                  |                       | valE                  |
|           | R[rA]                 |                     |                        |                       |                       | valM                  |                       |                       |                     |                       | valM                  |                       |                       |
|           | R[rB]                 | ValE                | valE if cnd            | valE                  |                       |                       |                       |                       |                     |                       |                       | valE                  | R[%rbp] = valM        |
| PC Updt.  | PC                    | valP                | valP                   | valP                  | valP                  | valP                  | cnd?valC:valP         | valC                  | valP                | valM                  | valP                  | valP                  | valP                  |