Denis Doci

doci2

663855180

Part A:

Given examples of possible stalls:

1.

mrmovq 0(%rcx), %rdx

pushq %rdx

2.

popq %rdx

rmmovq %rax, 0(%rdx)

Formula:

Solving hazards requires the following code implementation:

//Recognizes the fetch stall in example 1

bool F\_stall =

        E\_icode in { IMRMOVQ, IPOPQ } &&

        (E\_dstM == d\_srcB ||

        (E\_dstM == d\_srcA && !D\_icode in { IRMMOVQ, IPUSHQ})) ||

        IRET in { D\_icode, E\_icode, M\_icode };

//Recognizes the decode stall in example 2

bool D\_stall =

        E\_icode in { IMRMOVQ, IPOPQ } &&

        (E\_dstM == d\_srcB ||

        (E\_dstM == d\_srcA && !D\_icode in {IRMMOVQ, IPUSHQ}));

//produces bubble (or stall) for both codes. Load use hazard

//only requires one stall.

bool E\_bubble =

        (E\_icode == IJXX && !e\_Cnd) ||

        E\_icode in { IMRMOVQ, IPOPQ } &&

        ( E\_dstM == d\_srcB ||

        (E\_dstM == d\_srcA && !D\_icode in {IRMMOVQ, IPUSHQ}));

//forwarding destination

word e\_valA = [

        M\_dstM == E\_srcA && E\_icode in { IPUSHQ, IRMMOVQ} :m\_valM;

        1 : E\_valA;

];