## Dynamic Pipeline Structure



## Data Structures (ARF/RRF)



RS

| data1 | rr\#1 | data2 | rr\#2 | opcode | rr\# |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |


|  | RRF |  |
| :---: | :---: | :---: |
|  | data | valid |
| 0 |  | $\times$ |
| 1 |  | $\times$ |
| 2 |  | $\times$ |
| 3 |  | $\times$ |

ROB

| instr addr | ar\# | rr\# | exception | Finished |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

tail head

## Data Structures (RAT/PRF)

|  | RAT |  |
| :---: | :---: | :---: |
|  | ar\# | rr\# |
| R0 | 0 | 0 |
| R1 | 1 | 1 |
| R2 | 2 | 2 |
| R3 | 3 | 3 |

RS

| data1 | pr\#1 | data2 | pr\#2 | opcode | pr\# |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |


|  | PRF |  |
| :---: | :---: | :---: |
|  | data | valid |
| 0 | 6 | $\checkmark$ |
| 1 | 2 | $\checkmark$ |
| 2 | 10 | $\checkmark$ |
| 3 | 8 | $\checkmark$ |
| 4 |  | $\times$ |
| 5 |  | $\times$ |
| 6 |  | $\times$ |
| 7 |  | $\times$ |

freelist: 4, 5, 6, 7

Data Structures (RAT/PRF delayed read)

RS

| pr\#1 | valid | pr\#2 | valid | opcode | pr\# |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |


freelist: 4, 5, 6, 7

