Currently known bugs/features of the PPU and how to workaround them

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February 7, 2017

1. Conditionals
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4. syncing
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conditionals

```
li %r0, 1
li %r1, 0x2222
li %r2, 0x3333
fxvsplath 0, %r0
fxvsplath 1, %r1
fxvsplath 2, %r2
fxvsplath 3, %r0
fxvsplath 4, %r0
fxvcmph 0
fxvaddhm 3, 1, 2, 1
fxvaddhm 4, 2, 2, 2
```

expected result

```
vr0: 0001 0001 0001 0001 0001 0001 0001 0001
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 3333 3333 3333 3333 3333 3333 3333 3333
vr3: 5555 5555 5555 5555 5555 5555 5555 5555
vr4: 0001 0001 0001 0001 0001 0001 0001 0001
```

actual result

```
vr0: 0001 0001 0001 0001 0001 0001 0001 0001
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 3333 3333 3333 3333 3333 3333 3333 3333
vr3: 5555 5555 5555 5555 5555 5555 5555 5555
vr4: 5555 5555 5555 5555 5555 5555 5555 5551
```

possible workarounds

zeros

```
li %r0, 0
li %r1, 1
li %r2, 0x2222
li %r3, 0x3333
fxvsplath 0, %r0
fxvsplath 1, %r1
fxvsplath 2, %r2
fxvsplath 3, %r3
fxvsplath 4, %r1
fxvsplath 5, %r1
fxvcmph 1
fxvaddhm 4, 0, 0, 0
fxvaddhm 4, 2, 1, 1
fxvaddhm 5, 0, 0, 0
fxvaddhm 5, 3, 3, 2
```

```
vr0: 0001 0001 0001 0001
vr1: 2222 2222 2222 2222
vr2: 3333 3333 3333 3333
vr3: 5555 5555 5555 5555
vr4: 0000 0000 0000 0000
```

previous content

```
li %r0, 0
li %r1, 1
li %r2, 0x2222
li %r3, 0x3333
fxvsplath 0, %r0
fxvsplath 1, %r1
fxvsplath 2, %r2
fxvsplath 3, %r3
fxvsplath 4, %r1
fxvsplath 5, %r1
fxvcmph 1
fxvaddhm 4, 4, 0, 0
fxvaddhm 4, 2, 1, 1
fxvaddhm 5, 5, 0, 0
fxvaddhm 5, 3, 3, 2
```

```
vr0: 0001 0001 0001 0001
vr1: 2222 2222 2222 2222
vr2: 3333 3333 3333 3333
vr3: 5555 5555 5555 5555
vr4: 0001 0001 0001 0001
```

first operand's value

```
li %r0, 0
li %r1, 1
li %r2, 0x2222
li %r3, 0x3333
fxvsplath 0, %r0
fxvsplath 1, %r1
fxvsplath 2, %r2
fxvsplath 3, %r3
fxvsplath 4, %r1
fxvsplath 5, %r1
fxvcmph 1
fxvaddhm 4, 2, 0, 0
fxvaddhm 4, 2, 1, 1
fxvaddhm 5, 3, 0, 0
fxvaddhm 5, 3, 3, 2
```

```
vr0: 0001 0001 0001 0001
vr1: 2222 2222 2222 2222
vr2: 3333 3333 3333 3333
vr3: 5555 5555 5555 5555
vr4: 0001 0001 0001 0001
```

problem

```
li %r0, 0
...
li %r0, 1
fxvsplatb 0, %r0
```

expected result

```
vr0: 0001 0001 0001 0001 0001 0001 0001 0001
```

actual result

```
vr0: 0000 0000 0000 0000 0000 0000 0000 0000
```

possible workarounds

sync

```
li %r0, 0
...
li %r0, 1
fxvsplatb 0, %r0
sync
```

```
vr0: 0001 0001 0001 0001
```

use splath

```
li %r0, 0
...
li %r0, 1
sync
fxvsplath 0, %r0
```

```
vr0: 0001 0001 0001 0001
```

fxvpck

nux manual

```
li %r0, 0x11
li %r1, 0x22
fxvsplatb 0, %r0
fxvsplatb 1, %r1
fxvpcku 2, 0, 1
```

```
vr0: 1111 1111 1111 1111 1111 1111 1111 1111
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 1122 1122 1122 1122 1122 1122 1122 1122
```

actual implementation

```
li %r0, 0x11
li %r1, 0x22
li %r31, 0x3000
addi %r30, r%31, 0x10
fxvsplatb 0, %r0
fxvsplatb 1, %r1
fxvstax 0, 0, %r31
fxvstax 1, 0, %r30
fxvpcku 2, %r31, %r30
```

```
vr0: 1111 1111 1111 1111 1111 1111 1111 1111
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 1122 1122 1122 1122 1122 1122 1122 1122
```

equivalent for fxvupck

possible workarounds

nux manual

```
li %r0, 0x11
li %r1, 0x22
fxvsplatb 0, %r0
fxvsplatb 1, %r1
fxvpcku 2, 0, 1
```

```
vr0: 1111 1111 1111 1111 1111 1111 1111 1111
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 1122 1122 1122 1122 1122 1122 1122 1122
```

actual implementation

```
li %r0, 0x11
li %r1, 0x22
li %r31, 0x3000
addi %r30, r%31, 0x10
fxvsplatb 0, %r0
fxvsplatb 1, %r1
fxvstax 0, 0, %r31
fxvstax 1, 0, %r30
fxvpcku 2, %r31, %r30
```

```
vr0: 1111 1111 1111 1111 1111 1111 1111 1111
vr1: 2222 2222 2222 2222 2222 2222 2222 2222
vr2: 1122 1122 1122 1122 1122 1122 1122 1122
```