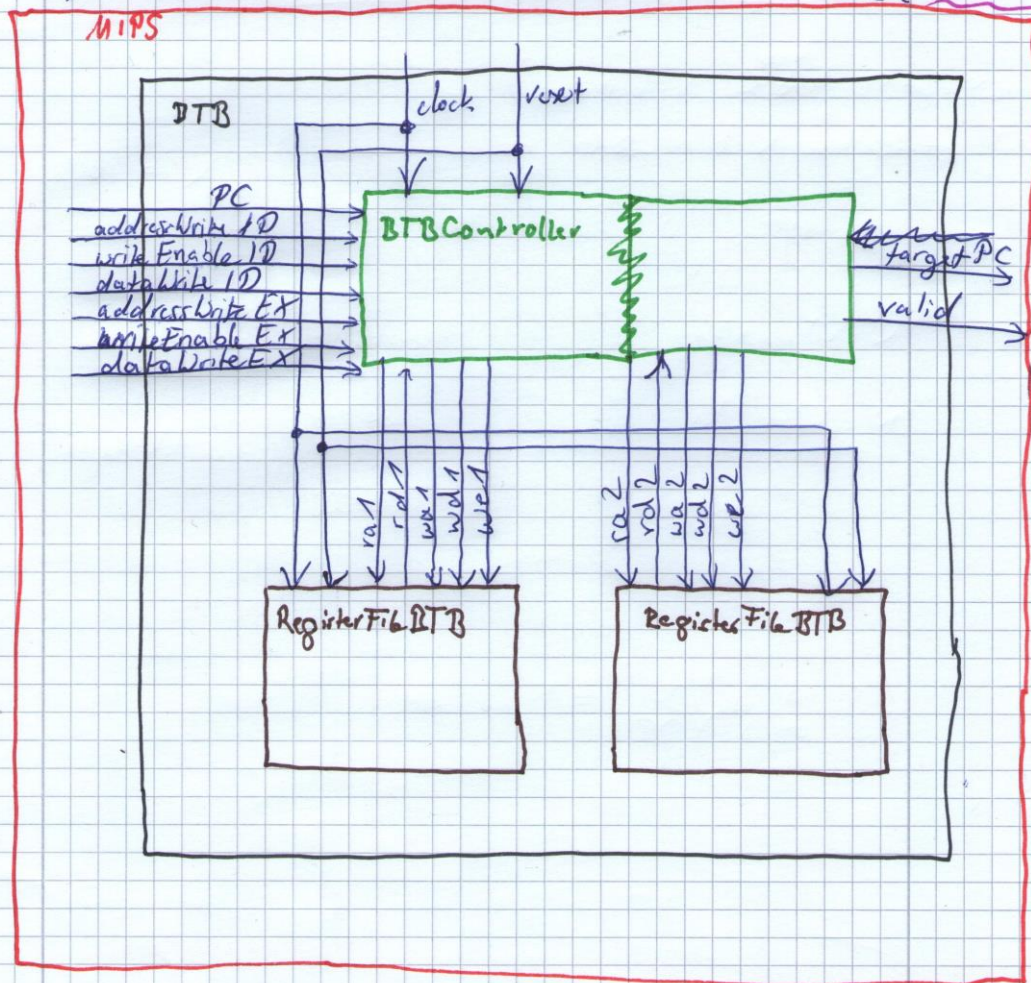


Branch Target Buffer (BTB)

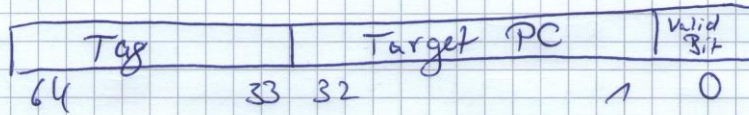
Branch Target Buffer (BTB)

generic variables:

- 1) BTB_ENTRIES : INTEGER := 16
- 2) BTB_INDEXSIZE : INTEGER := $\log_2(\text{BTB_ENTRIES})$



Zeile im Register File BTB



Logik BTB Controller

$$\text{valid} = \begin{cases} '1' & , \text{ if } \left((\text{rd1.valid} = '1' \text{ and } \text{rd1.tag} = \text{PC.tag}) \right. \\ & \left. \text{or } (\text{rd2.valid} = '1' \text{ and } \text{rd2.tag} = \text{PC.tag}) \right) \\ '0' & , \text{ otherwise} \end{cases}$$

$$\text{target PC} = \begin{cases} \text{rd1.target} & , \text{ if } \text{rd1.valid} = '1' \\ \text{rd2.target} & , \text{ if } \text{rd2.valid} = '1' \\ "0000...0" & , \text{ otherwise} \end{cases}$$

~~ra1~~

$$\text{ra1} = \text{PC} \left(6 \text{ downto } 2 \right)$$

$$\text{ra2} = \text{PC} \left(6 \text{ downto } 2 \right)$$

$$\text{wa1} = \left\{ \begin{array}{l} \text{wa2} = \end{array} \right.$$

$$\text{wd1} = \left\{ \begin{array}{l} \text{wd2} = \end{array} \right.$$

$$\text{we1} = \left\{ \begin{array}{l} \text{we2} = \end{array} \right.$$

$$wa1 = \begin{cases} PC_EX(6 \text{ downto } 2), & \text{if } (writeEnableEX = '1') \\ & \text{and } (regEXValid = '1') \\ PC_EX(6 \text{ downto } 2), & \text{if } (writeEnableID = '1') \\ & \text{and } (regIDValid = '1') \\ "000...0" & , \text{ otherwise} \end{cases}$$

$$wa2 = \begin{cases} PC_EX(6 \text{ downto } 2), & \text{if } (writeEnableEX = '1') \\ & \text{and } (regEXValid = 2) \\ PC_EX(6 \text{ downto } 2), & \text{if } (writeEnableID = '1') \\ & \text{and } (regIDValid = 2) \\ ("000...0") & , \text{ otherwise} \end{cases}$$

$$wd1 = \begin{cases} dataWriteEX & \text{if } writeEnableEX = '1' \\ & \text{and } regEXValid = 1 \\ dataWriteID & \text{if } writeEnableID = '1' \\ & \text{and } regIDValid = 1 \\ "000...0" & \text{otherwise} \end{cases}$$

$$wd2 = \begin{cases} dataWriteEX & \text{if } writeEnableEX = '1' \\ & \text{and } regEXValid = 2 \\ dataWriteID & \text{if } writeEnableID = '1' \\ & \text{and } regIDValid = 2 \\ "000...0" & \text{otherwise} \end{cases}$$

$$we1 = \begin{cases} '1' & \text{if } writeEnableEX = '1' \\ & \text{and } regEXValid = 1 \\ '1' & \text{if } writeEnableID = '1' \\ & \text{and } regIDValid = 1 \\ '0' & \text{otherwise} \end{cases}$$

$$we2 = \begin{cases} '1' & \text{if } writeEnableEX = '1' \\ & \text{and } regEXValid = 2 \\ '1' & \text{if } writeEnableID = '1' \\ & \text{and } regIDValid = 2 \\ '0' & \text{otherwise} \end{cases}$$