Address Mapping

16 GB DIMM using x8 devices

- Each channel needs 4 devices/rank to provide 32 bits (4 bytes) at a time
- Each channel has 16GB/2 = 8GB
- 8GB/4 bytes = 2G addresses x 4 bytes
- Each device is x8 so each device is 2G x 8 = 16Gb
- There are 32 banks, so each bank provides 16Gb/32 = $2^{34}/2^{5} = 2^{29}$ bits
- The page size is given as 1KB = 8Kb/row = 2^{13} bits
- So there are $2^{29}/2^{13} = 2^{16}$ = 64K rows
- Each page is 8Kb / 8 bits/column = 2^{10} = 1024 columns
- Each burst provides 16 chunks x 8 bits = 2^{4} x $2^{3} = 2^{7}$ = 128 bits
- 8Kb/128 = $2^{13}/2^{7} = 2^{6}$, so a bank is internally 64K x 64 x 128

Address Mapping

Address bits

- 1 channel bit
- 2 BA (bank address) bits because 4 banks/bank group
- 3 BG (bank group) bits because 8 bank groups
- 16 row bits (64K rows/bank)
- 10 column bits (1K columns)
- Total of 32 bits
- But each chunk from DIMM is comprised of four bytes, so
- 2 byte select bits (which are not sent to DIMM)
- Total of 34 bits of (byte) address
- Check work: 2^{34} = 16MB

Address Mapping