# Example 1 – Search without Index

- Block size B=1024 bytes; unspanned blocking
- Ordered file for EMPLOYEE(NAME, SSN, ADDRESS, JOB, SAL, ... )
  - record size R=100 bytes
  - r=30000 records
  - blocking factor bfr = B/R= 1024/100= 10 records/block
  - number of file blocks b= (r/Bfr)= (30000/10)= 3000 blocks

- Average linear search cost for non-ordering fields:
  - (b/2)= 3000/2= 1500 block accesses
- Binary search cost for ordering-field:
  - $\log_2 b = \log_2 3000 = 12$ block accesses

# Example 1 - Search with Index

- Index on the ordering field Name
  - Name field size $V_{Name}$=9 bytes
  - record pointer size $P_R$=6 byte
  - index entry size $R_i$=($V_{Name}$+ $P_R$)=(9+6)=15 bytes
  - Number of index entries = number of data file blocks = 3000
  - index blocking factor $bfr_i$= B/$R_i$= 1024/15= 68 entries/block
  - number of index blocks bi = (3000/68)= 45 blocks

- Search cost
  - Binary search in the index: $\log_2$bi= $\log_2$45= 6 block accesses
  - Data access using the block pointer: 1 block access
  - Total block accesses: 7 blocks

# Example 2 - Search with Dense Secondary Index

- Employee File with ordering field name (as in Example 1)
- Secondary index on the non-ordering field SSN
  - Name field size $V_{SSN}$=9 bytes
  - record pointer size $P_R$=6 byte
  - index entry size $R_i$=($V_{SSN}$+ $P_R$)=(9+6)=15 bytes
  - Number of index entries = number of records = 30000
  - index blocking factor $bfr_i$= $B/R_i$= 1024/15= 68 entries/block
  - number of index blocks bi = (30000/68)= 442 blocks
- Search cost on non-ordering field SSN
  - Binary search in the index: $\log_2 bi = \log_2 442$= 9 block accesses
  - Data access using the block pointer: 1 block access
  - Total block accesses: 10 blocks
- Search cost on SSN without secondary index (linear search): 1500 blocks
- Search cost on ordering field with primary index: 7 blocks