

# File size with multi-level indexed files

File size using 12 direct blocks :  $12 \times 4 \text{ KB} = 48 \text{ KB}$

➡ Adding single indirect block :  $(12 + 1024) \times 4 \text{ KB} \sim 4 \text{ MB}$

➡ Adding a double indirect block :  
 $(12 + 1024 + 1024^2) \times 4 \text{ KB} \sim 4 \text{ GB}$

➡ Adding a triple indirect block :  
 $(12 + 1024 + 1024^2 + 1024^3) \times 4 \text{ KB} \sim 4 \text{ TB}$

# Rationale behind multi-level index files

- **Most files are small**  
~2K is the most common size
- **Average file size is growing**  
Almost 200K is the average
- **Most bytes are stored in large files**  
A few big files use most of space
- **File systems contains lots of files**  
Almost 100K on average
- **File systems are roughly half full**  
Even as disks grow, file systems remain ~50% full
- **Directories are typically small**  
Many have few entries; most have 20 or fewer