

# Progressive File Layout (PFL)

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# Agenda

- Current File Layout
- PFL Goals
- Composite File Layout
- Tools for Using PFL File
- Future Work
- Q/A



# **Current File Layout**

- Only simple RAID0 (striping) layouts are supported
- File layout is decided on creation, can't be changed.
- Several ways to specify layout of a file:
  - Create file by 'lfs setstripe'
  - Inherit default layout from parent directory
  - Inherit FS default layout



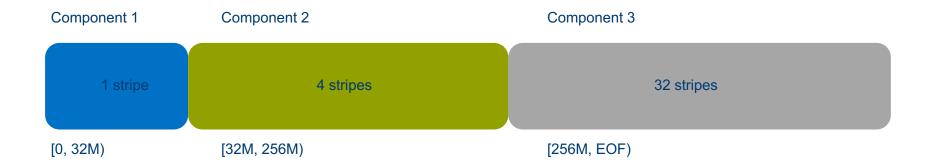
#### **PFL Goals**

- Minimize stripe count for small files
  - Avoid overhead of creating multiple OST objects
  - Avoid stat/size overhead for many stripes
- Maximum stripe count for large files
  - Use all available OST bandwidth
  - Distribute OST space usage to avoid space imbalance
- Flexibility of layouts for different uses
  - One layout is suitable for a majority of uses and files
  - Allow for variability and flexibility of users, applications, sites



# **Composite File Layout**

- Layout is composite of multiple components
- Each component is a plain V1/V3 layout and describes extent of file
- Component extent can't be disjoint or overlapping for PFL layout





# Tools for Using PFL File

- 'lfs setstripe', 'lfs getstripe', 'lfs migrate' and 'lfs find' are modified to support PFL, bunch of new component options introduced:
  - --component-end | -E: component extent end
  - -- component-start: component extent start
  - --component-id | -I: component ID
  - --component-count: component count
  - --component-flags | -F: component flags
  - -component-add: Add component(s)
  - --component-del: Delete component(s)



# Tools for Using PFL File (cont)

- Create a 2 components PFL file
  - lfs setstripe -E 4M -c 1 -E 256M -c 4 /mnt/lustre/pfl
- Add/Delete a component to/from an existing PFL file
  - lfs setstripe --component-add -E -1 -c 16 /mnt/lustre/pfl
  - lfs setstripe --component-del -I 3 /mnt/lustre/pfl
- Migrate a plain file to a PFL file
  - lfs migrate -E 1M -c 1 -E 64M -c 4 -E -1 -c 8/mnt/lustre/plain
- Set default PFL to a directory
  - lfs setstripe -d -E 1M -c 1 -p pool\_fast -E EOF -c 4 -p pool\_large /mnt/lustre/dir



### **Future Work**

- Create OST objects for PFL file on demand during write
  - Currently create all objects at open
- Other layout support: file level replication, etc.





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