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**Los Alamos**  
NATIONAL LABORATORY

# Managing IOCs with Local Filesystems

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10/05/2013

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Operated by Los Alamos National Security, LLC for the U.S. Department of Energy's NNSA





# New trends: Many more IOCs; Readily available flash memory.

- Our upgrade path will result in an order of magnitude more IOCs.
- It is no longer acceptable to walk the accelerator pressing reset buttons after a site-wide power outage.
- The flash memory available or already included with new IOCs, provides a solution.

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# IOCs that boot from NFS have features we should preserve

- Changes are made on the NFS server, and take effect at the next boot.
- The IOC does not have to be reachable to make changes.
- Autosave files are still available for use by a spare IOC in the event of hardware failure.
- Pull from server is more robust than push.

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# Disadvantages of IOCs that boot from NFS

- The IOC cannot boot if the network or the NFS server is down.
- If the NFS server is unreachable the IOC gets stuck.
- If a reboot occurs while rebuilding files, the IOC can get stuck.
- Autosave files can't be saved while the network is down.

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# Plan: IOCs sync with server, but boot from the local filesystem

- A very simple local startup script
  - Loads the kernel
  - Mounts the NFS server
  - Copies the IOC specific startup script.
- Files are copied by the script that uses them
  - The first script doesn't need the entire list.
- Autosave .sav files are stored locally, but periodically copied to the NFS server.

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## A few simple utilities needed

- *cpnew* (the equivalent of “*cp -u*” on linux)
  - Can’t use EPICS OSI.
  - Uses only POSIX functions.
  - Newer files must be at least 3 seconds newer
    - FAT32 files systems have low timestamp precision
- *cpsys* (Also reboots the IOC if files are copied)
  - Used for kernel updates.
- Periodic backup tool

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# Periodic backup tool: Updates NFS server with local data files

- Autosave itself can almost perform this function with a periodic backup set.
  - Autosave will recover from stale NFS handles, but does not mount the server if it has never been mounted.
  - A separate location for the periodic backup set can only be specified after IOC start.

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# Disadvantages

- Requires multiple reboots if the kernel needs to be updated.
- If new IOC is installed, one must be careful if files are installed using a tool that doesn't preserve the original file date.
  - Some drive imaging tools use the current date
    - if an old image is used it should exclude most of the files managed by these tools.
    - One must also verify that the latest kernel is included in the image.

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## Best of both worlds

- IOCs pull their own files at boot.
- Most boots are faster as only the filenames and timestamps are sent over the network.
- IOCs are fully functional if the NFS server is down, or if the network was down at boot.
- Missing files on the server (during a rebuild) don't result in a stuck IOC.
- Autosave .sav files are available for spares

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