NFSv4 Delegation in Solaris 10

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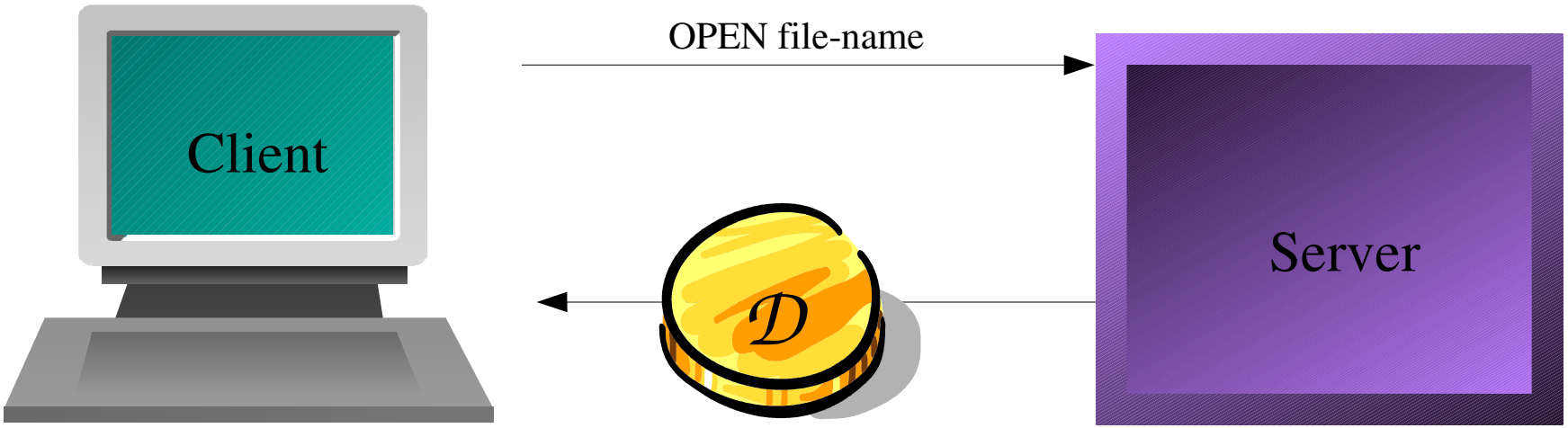
Sun microsystems

NFSv4 Delegation in Solaris 10

The technologies behind the scenes

NFSv4 Delegation

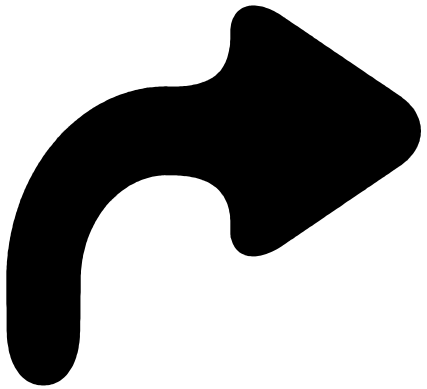
What is a delegation?



A guarantee by the server that no conflicting access to a file will occur without notification.

NFSv4 Delegation

Solaris Implementation

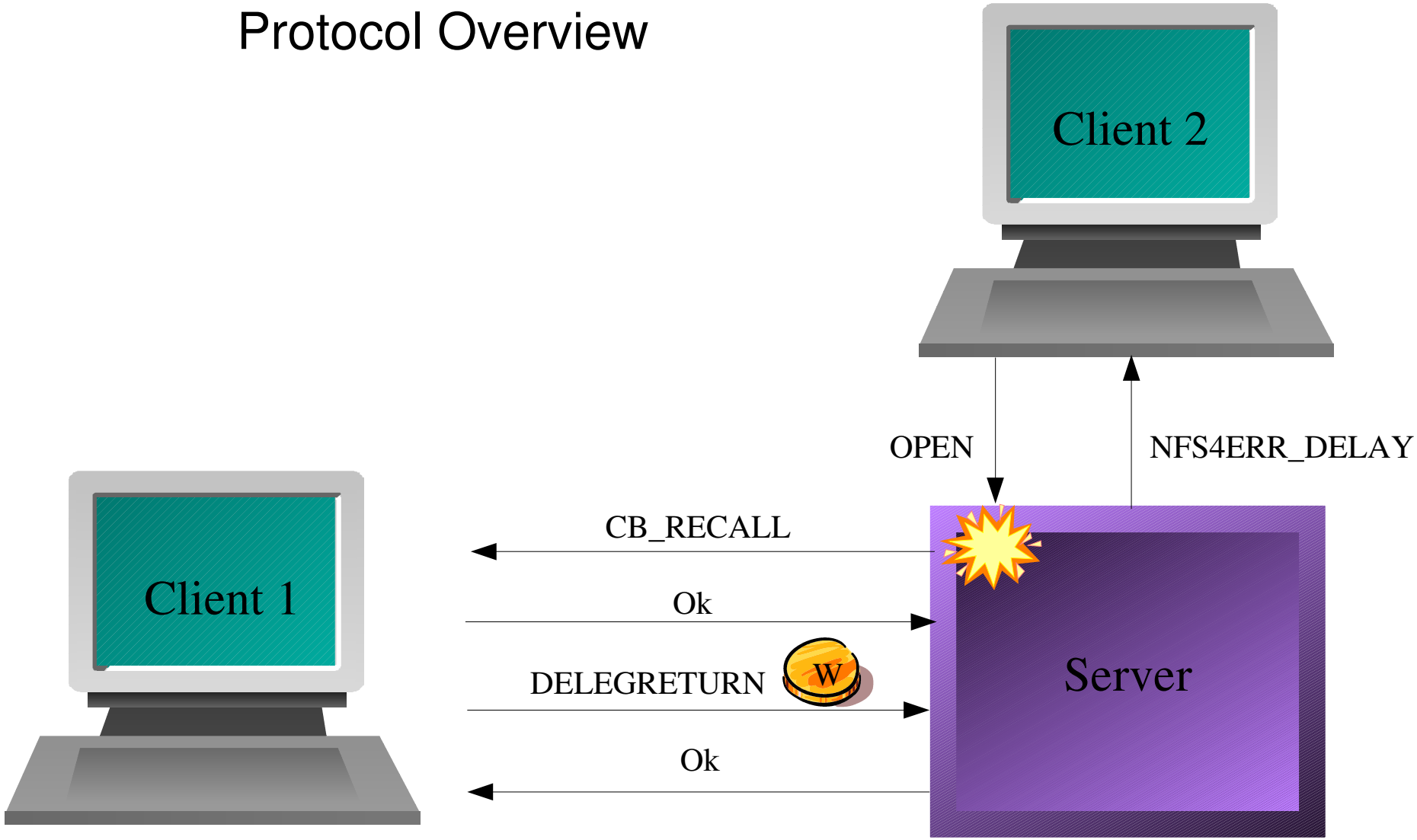


- Enabled by default
- Server offers both read & write
- Integrated with local access
- Integrated with v2 & v3 access
- Disabled via /etc/default/nfs

NFS_SERVER_DELEGATION=off

NFSv4 Delegation

Protocol Overview



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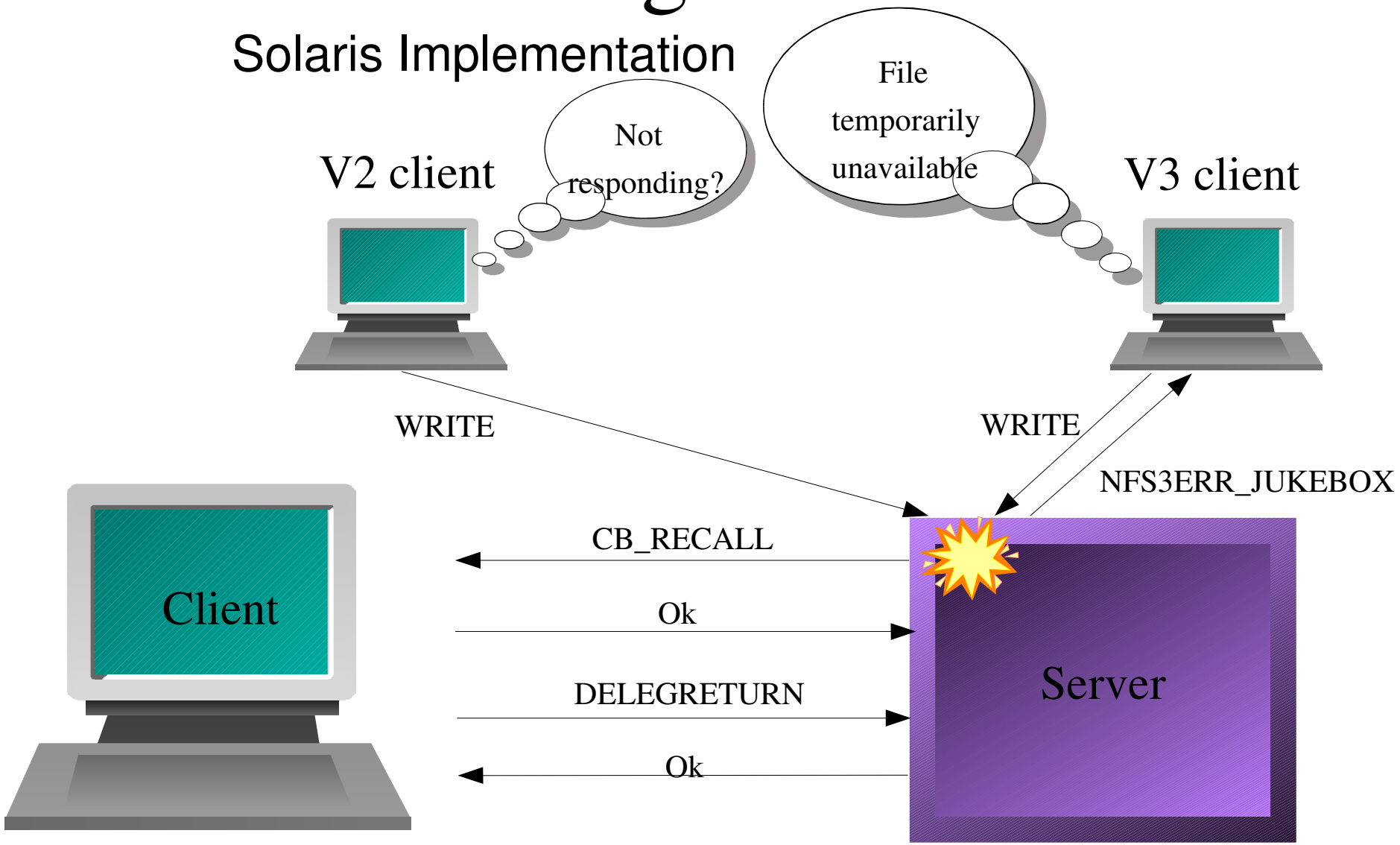
Solaris Implementation



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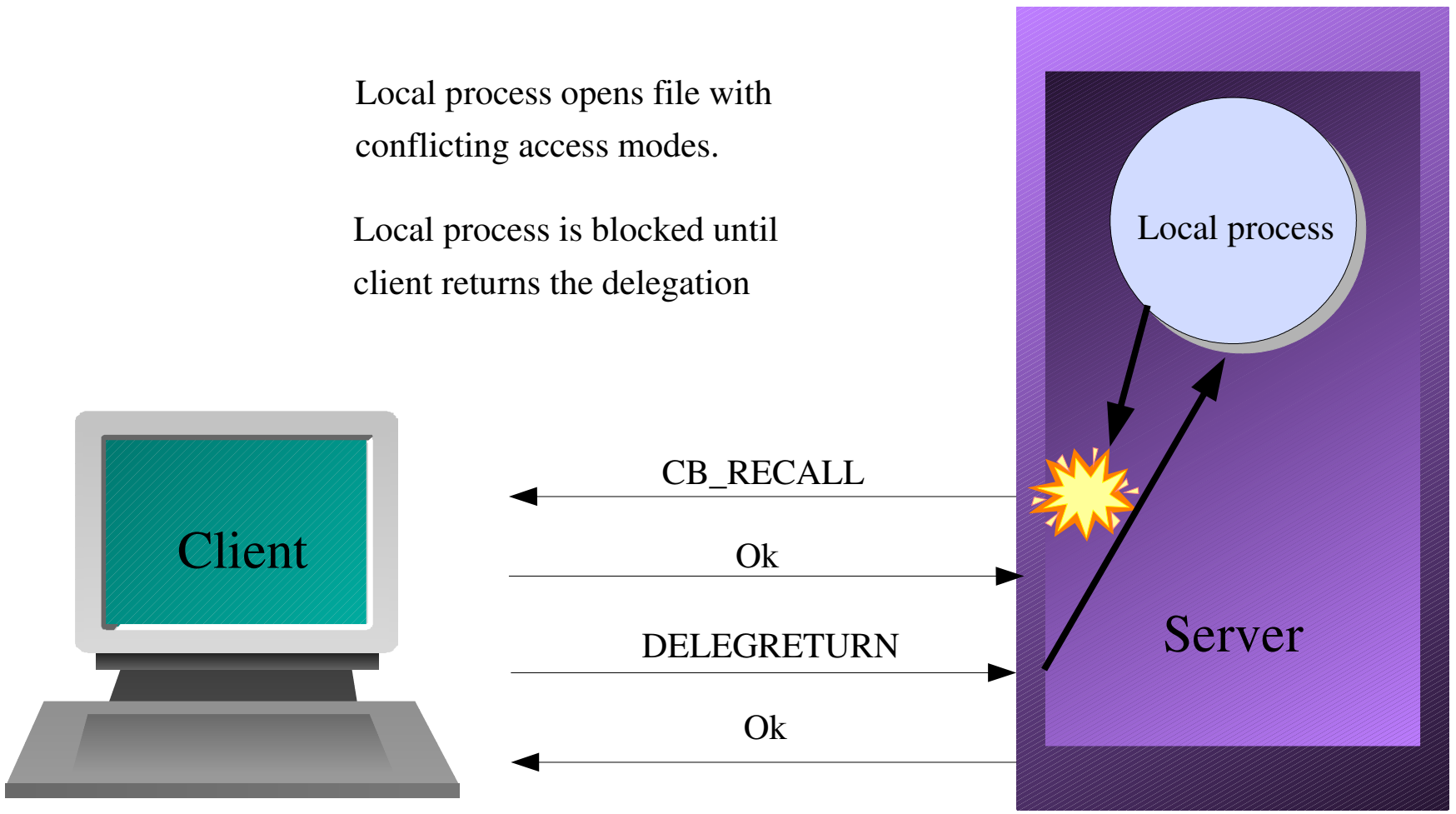
Solaris Implementation

Local process opens file with conflicting access modes.

Local process is blocked until client returns the delegation



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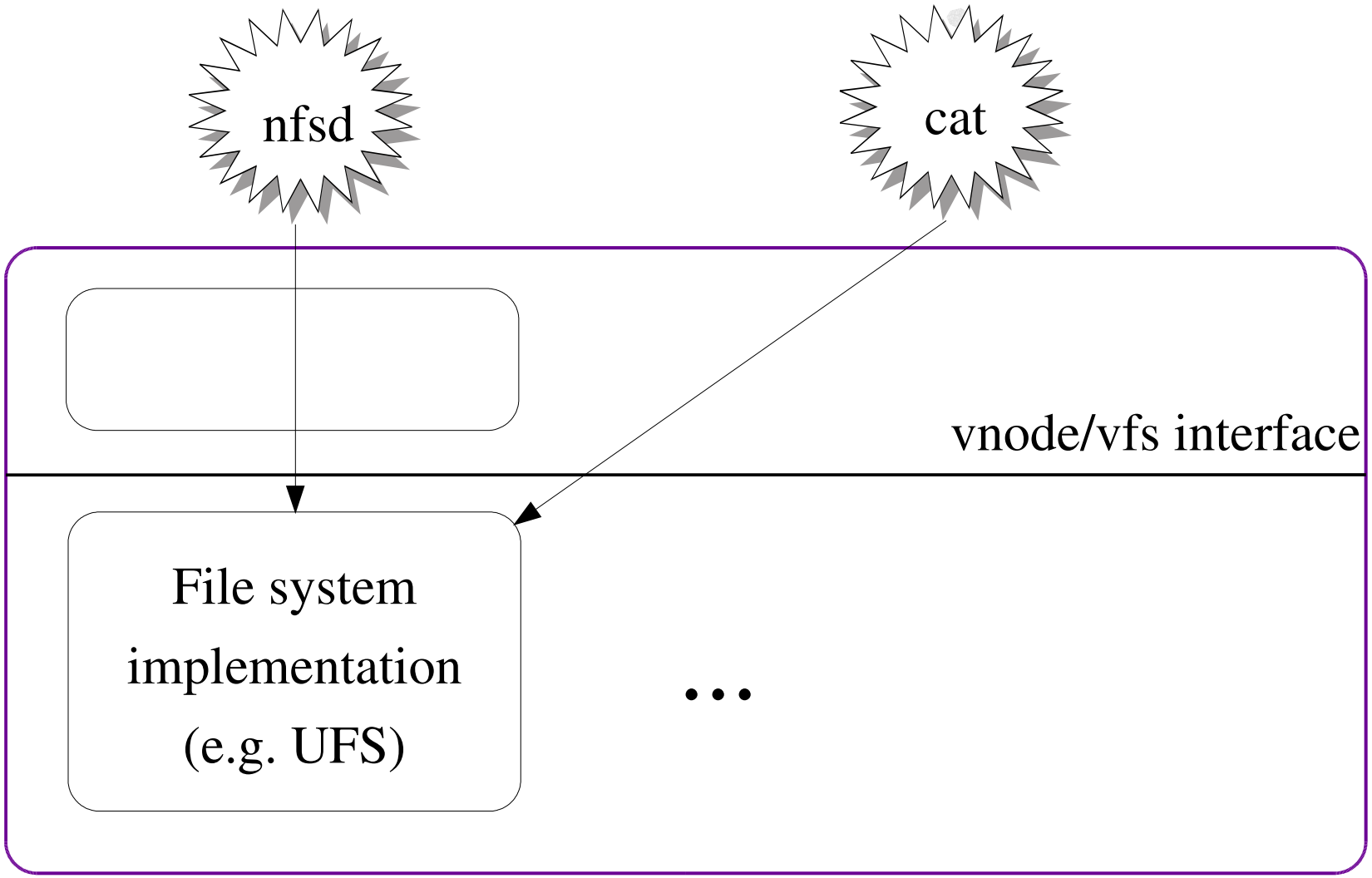
Integration with Local Access



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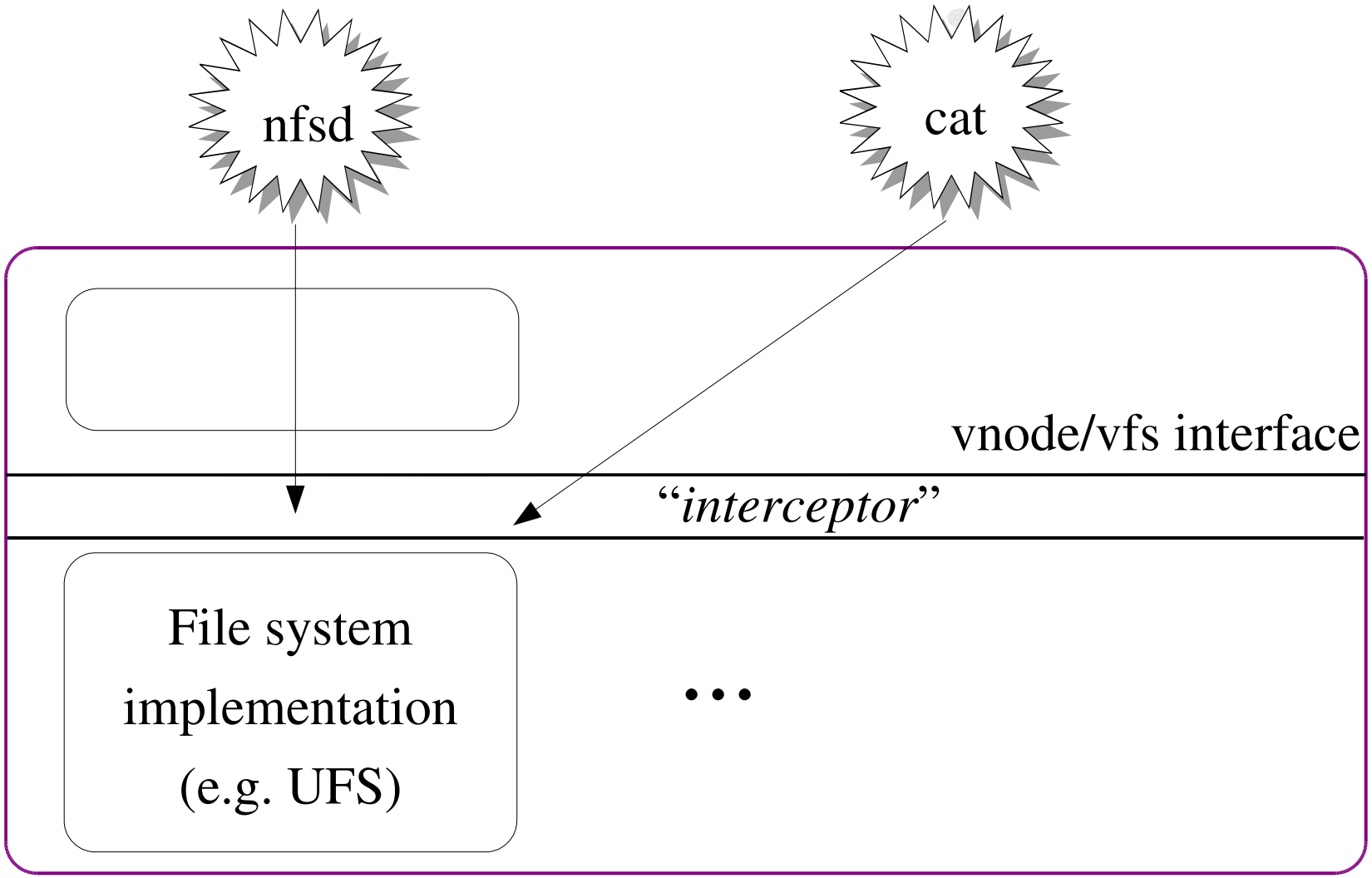
Integration with Local Access - File Event Monitors



NFSv4 Delegation

File Event Monitors – FEM

- Enable integration with local access
- Minimize changes to individual file systems
- Very low overhead on non-monitored files

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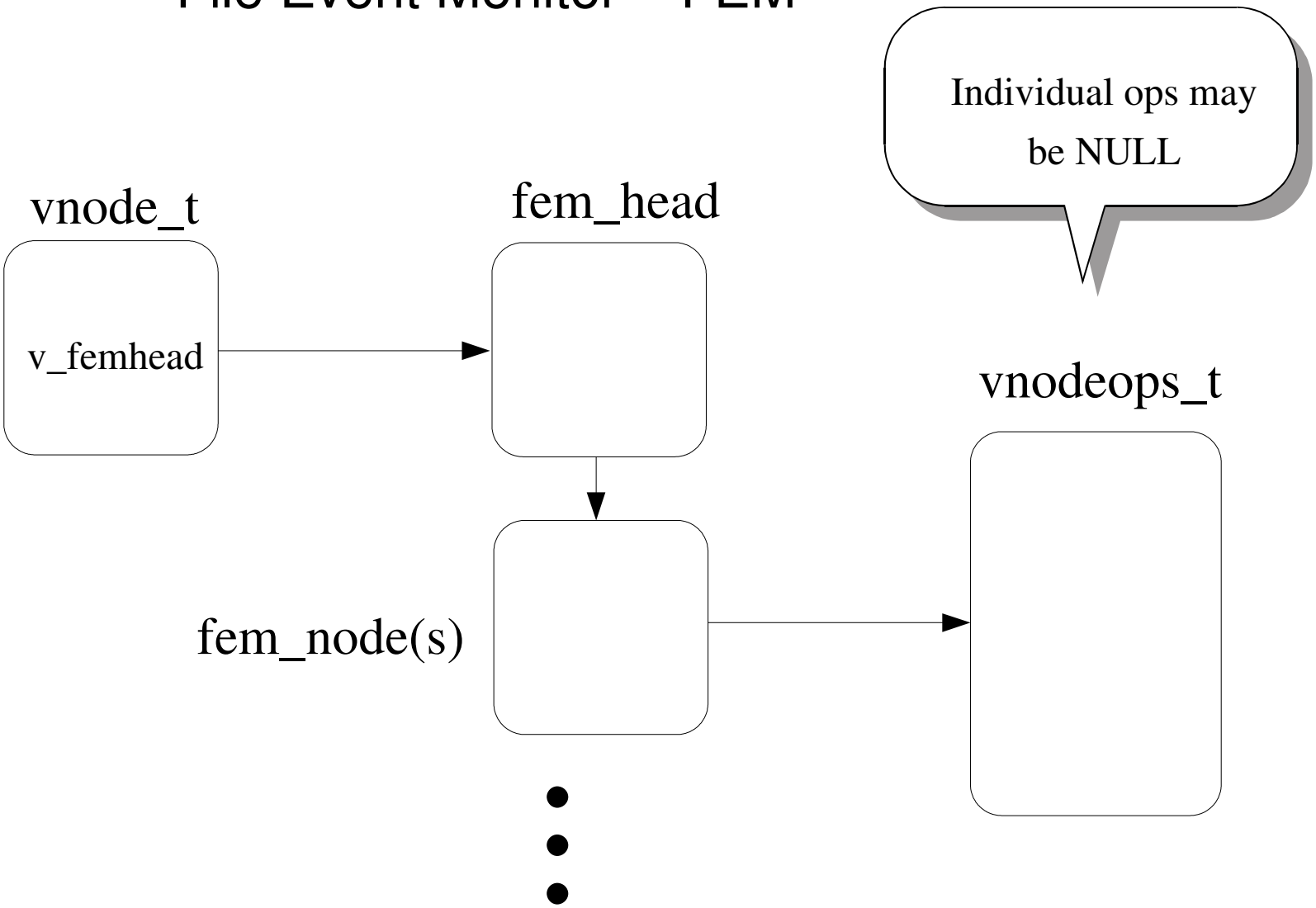
File Event Monitor – FEM



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File Event Monitor – FEM

The names have been changed to ...

```
fs_operation_def_t rfs4_deleg_templ [] =
     {{ VOPNAME_OPEN, deleg_open4read } ... };

server_init()
{
     fem_create("name", rfs4_deleg_templ, dops);
}
grant_delegation()
{
     fem_install(vp, dops, opaque, ...);
}
```

NFSv4 Delegation

File Event Monitor – FEM

```
deleg_open4read(femarg_t *fa, int mode, cred_t *cr)
{
     if (mode & (FWRITE|FTRUNC) {
          initiate_recall();
          wait4delegreturn();
     }
     return (vnext_open(fa, mode, cr));
}
```

Monitors may:

- Do extra processing
- Return an error
- Pass thru to the next level
- Both pre and post-op processing

NFSv4 Delegation

File Event Monitor – FEM

What are the User Level APIs?

"*We don't need no stinking APIs!*"

But, seriously, folks ...

NFSv4 Delegation

File Event Monitor – FEM

"*We don't need no stinking APIs!*"

A Tactical solution to an interesting problem

More to follow, watch this space

Possibilities:

- DMAPI
- FAM/fileschanged
- OpenSolaris?

NFSv4 Delegation

FEM – Lessons Learned

- Ill Defined vnode OPS are "Bad"
  - Open w/o close? How rude!
- Sufficiency is difficult to prove
  - Vnode interception interesting, but ...
- Deadlocks are hard to avoid
  - Monitor programming guidelines
  - Sample Monitors?

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