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Advanced Enterprise Administration for Perforce

Introduction

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- Introductions
- Class Schedule
- GUI vs. CLI
- P4Admin Demonstrations
- About the Exercises

Course Contents

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- Advanced Maintenance
- Offline Checkpoints
- Broker
- Replication – Introduction
- Replication – HA/DR, Build Farms, Forwarding Replicas
- Fully Distributed
- Security
- Advanced Tools
- Scripting

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Advanced Maintenance

Topics

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- Recover a Stored Spec Revision
- Lazy Copies
- Archive/Restore

Spec Depot

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- **Goal**
  - Recover specs such as clients and protection table
  - Keep history of changes to specs
  - Identify user who changed a spec

- **Implementation**
  - Separate spec depot automatically maintained by Perforce Server
  - Specs are stored as form files, which can be printed or synced
    - Grouped into directories by type, such as *client* or *label*

Spec Depot Usage

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- Spec depot stores specs like clients and protection table (not change)
- Tracing of changes by a user

```
p4 print -q //spec/label/lastbuild.p4s#1
# The form data below was edited by bruno
```

- Optional: controlling which specs are versioned

```
p4 depot specs
SpecMap:
    //specs/...
    -//specs/client/build_ws_*
```

Recovering a Stored Spec Revision

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- List revisions in the spec depot

```
p4 filelog //specs/client/bruno_ws.p4s
... #4 default change edit on 2014/11/01
... #3 default change edit on 2014/10/17
... #2 default change edit on 2014/07/01
... #1 default change add on 2013/11/20
```

- Display content of revisions

```
p4 print -a //specs/client/bruno_ws.p4s
```

- Replace spec with earlier version

```
p4 print -q //specs/client/bruno_ws.p4s#3 | p4 client -i
```

Branching and Lazy Copies

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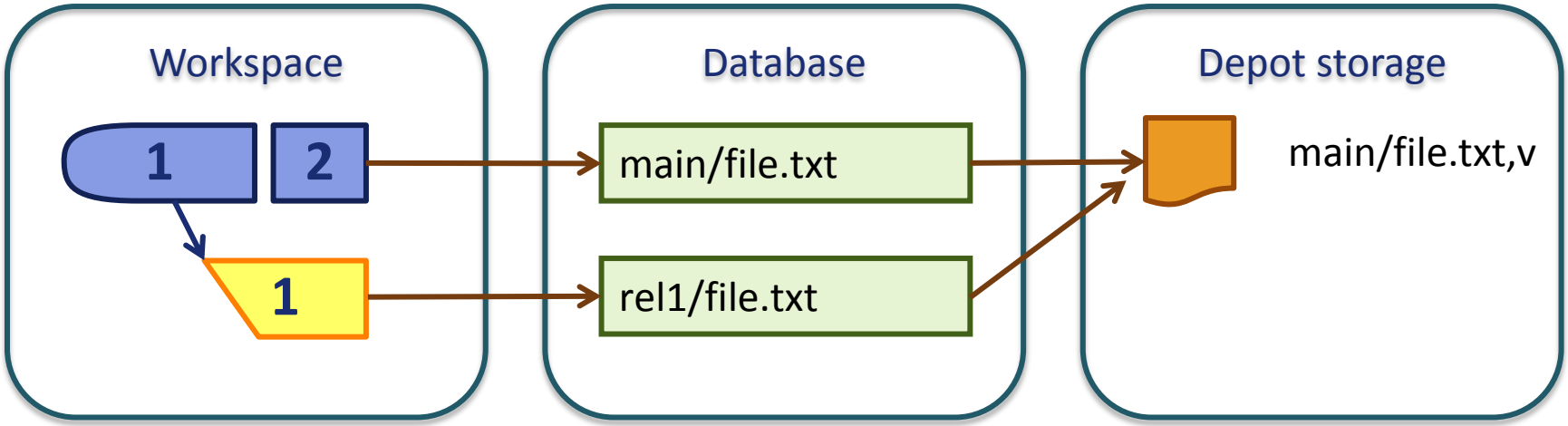
- Files branched or copied only create metadata entry in the database
  - Retain reference to original file location ➔ lazy copy



Lazy Copies and Snap

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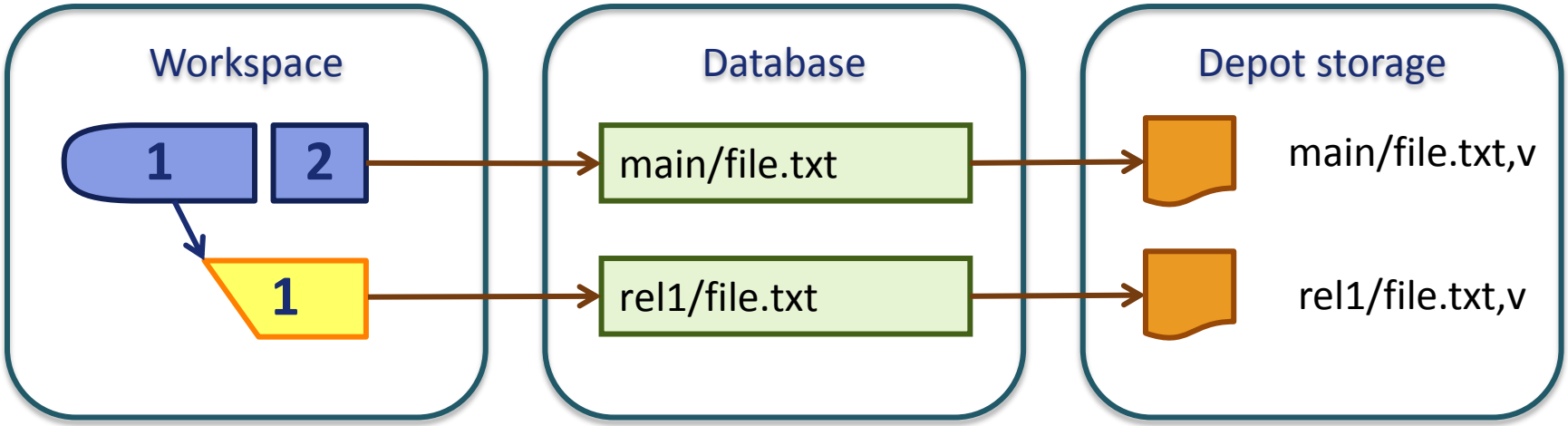
```
p4 fstat -Oc //depot/Jam/REL2.0/src/jam.c
...
... lbrFile //depot/Jam/MAIN/src/jam.c
... lbrRev 1.30
... lbrType text
... lbrIsLazy 1
```

(undocumented)

```
p4 snap //depot/Jam/REL2.0/src/jam.c
//depot/Jam/REL2.0/src/jam.c#1 -
        copy from //depot/Jam/MAIN/src/jam.c 1.30
```

After Snap

- Files in the depot storage are duplicated
- Useful when cleaning up depots with *obliterate*



Archiving and Restoring

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- Goal:
  - Free up space in active depots
  - Speed up backup and verify
  - Preserve history
  - Simple restore

- Implementation:
  - Separate archive depots (typically located on cheap storage)
  - Files can be archived and restored at individual revisions

Archiving and Restoring

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- Files *not branched* can be archived
  - Requires at least one depot of type *archive*
  - Preserves history

```
p4 archive -D archives //assets/...
```

- To archive files stored in delta format, use the -t option.

```
p4 archive -D archives -t //assets/text/readme.txt#9,9
```

- Restore files as needed

```
p4 restore -D archives  //assets/images/myimage.jpg#3
```

Archiving – Listing and Purging

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- Files in original depot are marked as *archive*

```
p4 files //assets/...
//assets/images/myimage.gif#1 - archive change 865 (ubinary)
...
```

- List files in archive depot

```
p4 files -A //archives/...
//archives/assets/images/myimage.gif#1
...
```

- Purge unneeded archived files (cannot be undone)

```
p4 archive -D archives -p //assets/...@2012/01/01
```

Exercises

Lab Set E1: Advanced Maintenance

New commands in this chapter (samples):

- `p4 archive`
- `p4 restore`
- `p4 snap (undoc)`

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Offline Checkpoints

Topics

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- Offline Checkpoints
  - Usage
  - Upgrades
  - Switch offline_db/root

Offline Checkpoint

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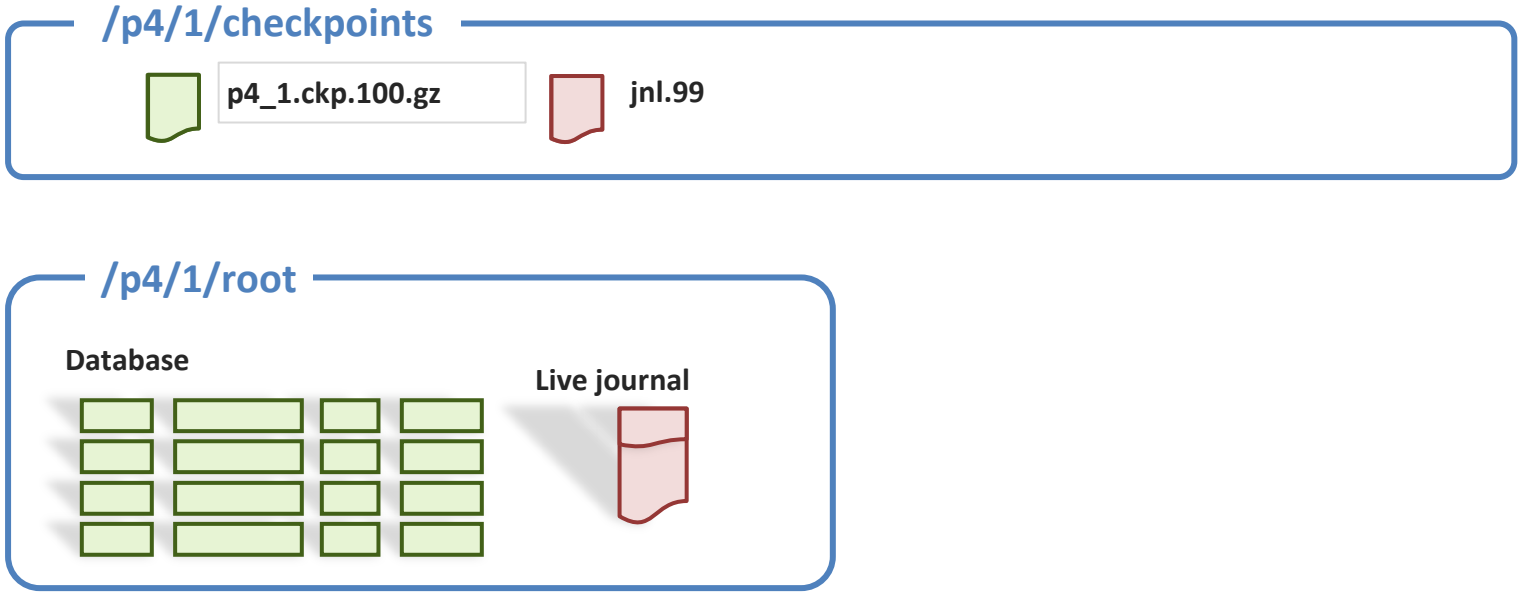
- **Goal**
  - Checkpoint without any downtime
  - Easy and fast recovery
  - Optional: regular database restoration
    - Restored databases are smaller than original, but contain equivalent data (Removes empty data pages and rebalances the b-tree indexes)
- **Implementation**
  - Separate offline database created from checkpoint
  - Regular updates through rotated journal
  - Offline database dumped into checkpoint

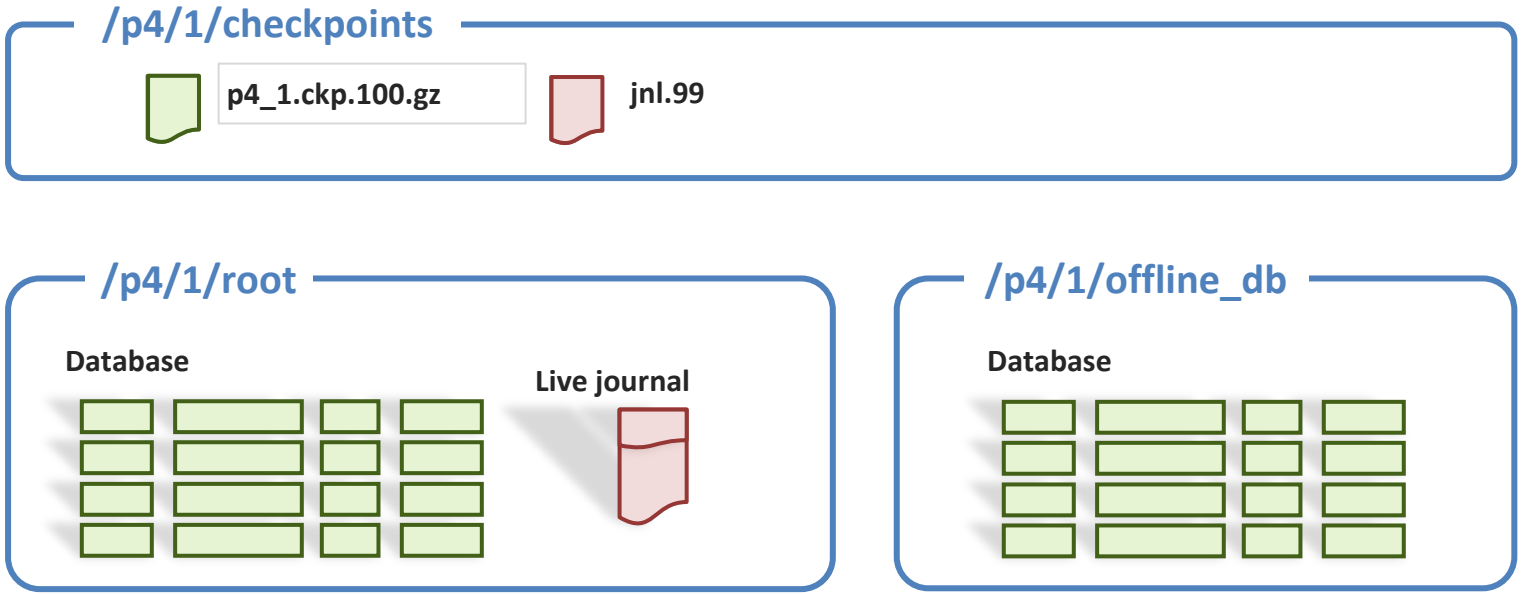
Prep Offline Checkpoint – Create Seed

```
p4d -r /p4/1/root -jc -Z /p4/1/checkpoints/p4_1
```



Prep Offline Checkpoint – Apply Seed

```
p4d -r /p4/1/offline_db -jr -z /p4/1/checkpoints/p4_1.ckp.100.gz
```



Offline Checkpoint

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- Nightly:
  - Truncate journal on live database

```
p4d -r /p4/1/root -J /p4/1/logs/journal -jj /p4/1/checkpoints/p4_1
```

  - Restore journal to offline directory

```
p4d -r /p4/1/offline_db -jr /p4/1/checkpoints/p4_1.jnl.100
```

  - Dump the offline database to make a new checkpoint

```
p4d -r /p4/1/offline_db -jd -z /p4/1/checkpoints/p4_1.ckp.101.gz
```

Offline Checkpoint

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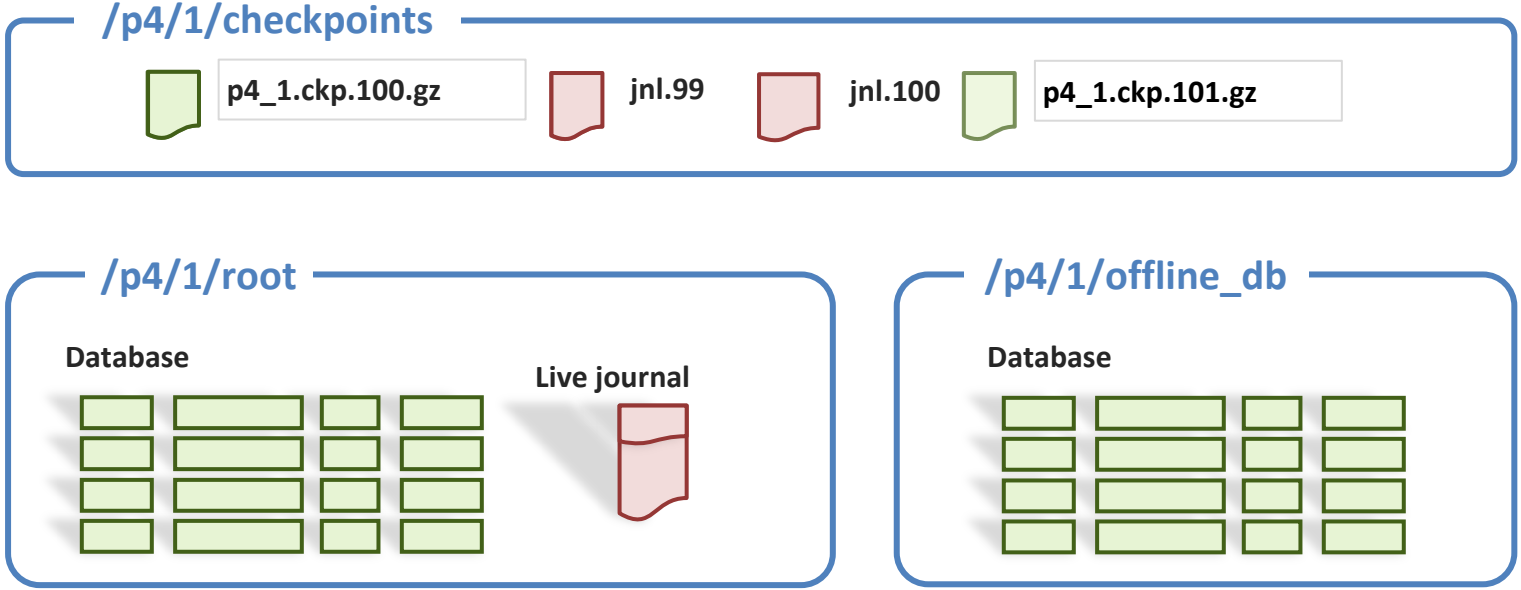
Truncate journal `-jj` › Restore journal `-jr` › Dump checkpoint `-jd`



Recreate Offline Database

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- Recreate the offline database from the new checkpoint

```
rm -f /p4/1/offline_db/db.*
p4d -r /p4/1/offline_db -jr -z /p4/1/checkpoints/p4_1.ckp.101.gz
```

Switch Offline Database/Root

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- Stop the production server
- Rotate the journal
- Replay the journal to the offline_db
- Move /p4/1/root/db.* /p4/1/root/save/
- Move /p4/1/offline_db/db.* /p4/1/root/
- Restart the master server
- Dump a checkpoint from /p4/1/root/save
- Recreate the offline database from the new checkpoint

Exercises

- Lab Set E2: Offline Checkpoints

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Broker

P4Broker

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- Intercepts all incoming Perforce commands
- Command handling support:
  - Redirection
  - Blocking
  - Rewriting (undocumented)
- Great for notifying users when the server is down for maintenance.
- Sometimes used as part of HA/DR strategies to avoid DNS change delay.

P4Broker Use Cases

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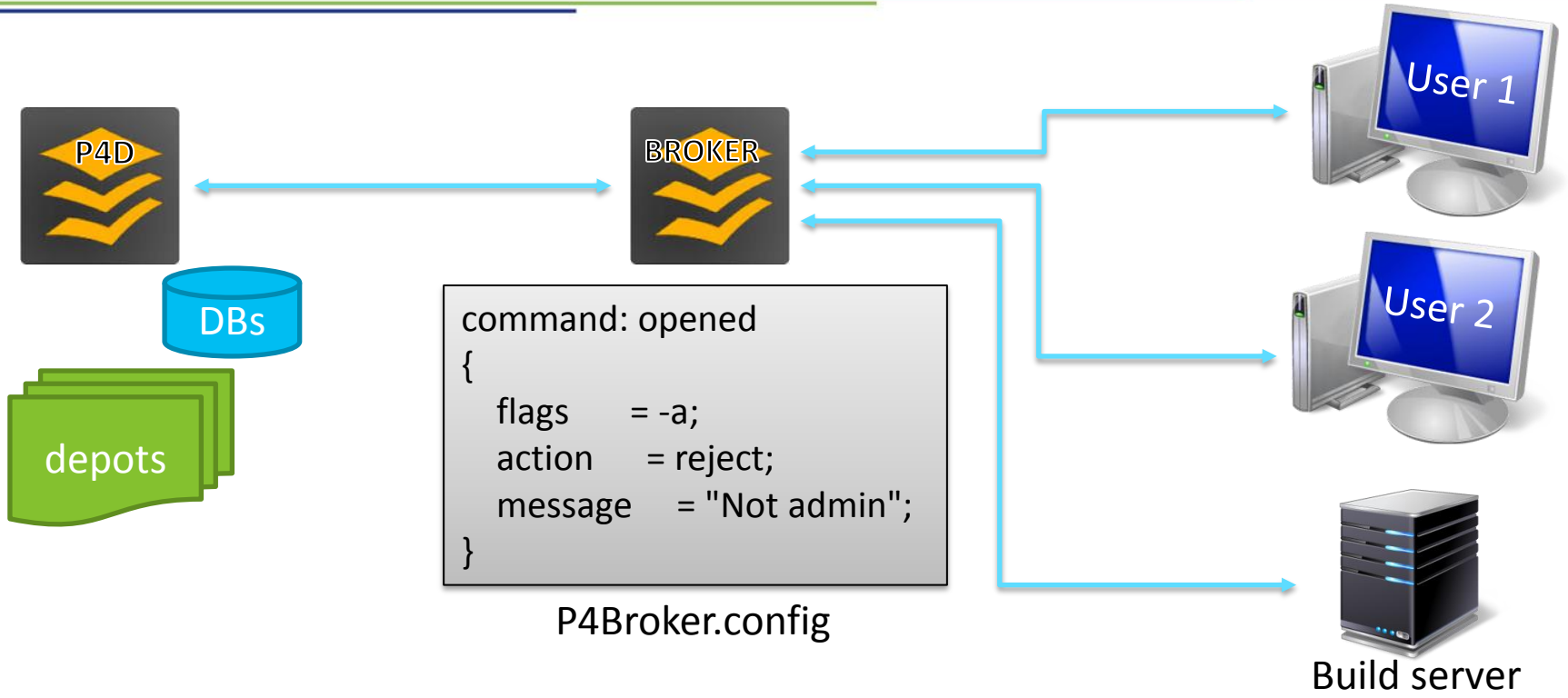
- Policy Customizations
  - different capabilities than triggers
- Traffic Redirection for Load Distribution
  - not “load balancing”
- Traffic Redirection for execution of automated failover operations
  - advanced/custom usage

Perforce Broker



Redirection

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- Selective – The default setting
  - Redirection allowed, but after the first command in a session hits the default server, all others in the same session use the default server and are not redirected.

- Pedantic – All redirected commands are redirected
  - Can cause the GUI to not update the icons correctly.

Read Only Commands

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- Redirect read only commands to replica servers to offload the master server
- P4Broker can do load balancing
  - Use the name “random” for the target server in a redirected command handler.
- http://kb.perforce.com/article/1354 -- Using P4Broker With Replica Servers
- (This particular use case can now be handled with a forwarding replica.)

Filter Scripts

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- When the action for a command handler is “filter”:
  - The broker executes the program or script and performs the action returned by the program.
- The broker invokes the filter program and passes in all the information about the command via stdin.
  - Your filter program must read this data from stdin before performing any additional processing.
- The filter program responds on stdout with one of the following:
  - action: PASS/REJECT/REDIRECT/RESPOND
  - message: Some message for the user

Mechanics: P4Broker Setup

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- Define an operating server.
- Generate a preliminary broker configuration file.
- Adjust the broker configuration to your needs.
- Set broker config file location.
- Initiate as a Windows service or Unix/Linux daemon.
- Documentation:
  - Latest Release Broker Notes
  - Distributing Perforce Manual

Exercises

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- Lab Set E3: P4Broker

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Replication - Introduction

Why Replication?

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- Disaster Recovery
  - Possibly read-only
- Offloading intense server traffic
  - Reports
  - Builds
- Forwarding Replica (aka Smart Proxy)
- Edge / Commit server architecture (distributed working)

Perforce Replication - Implementation

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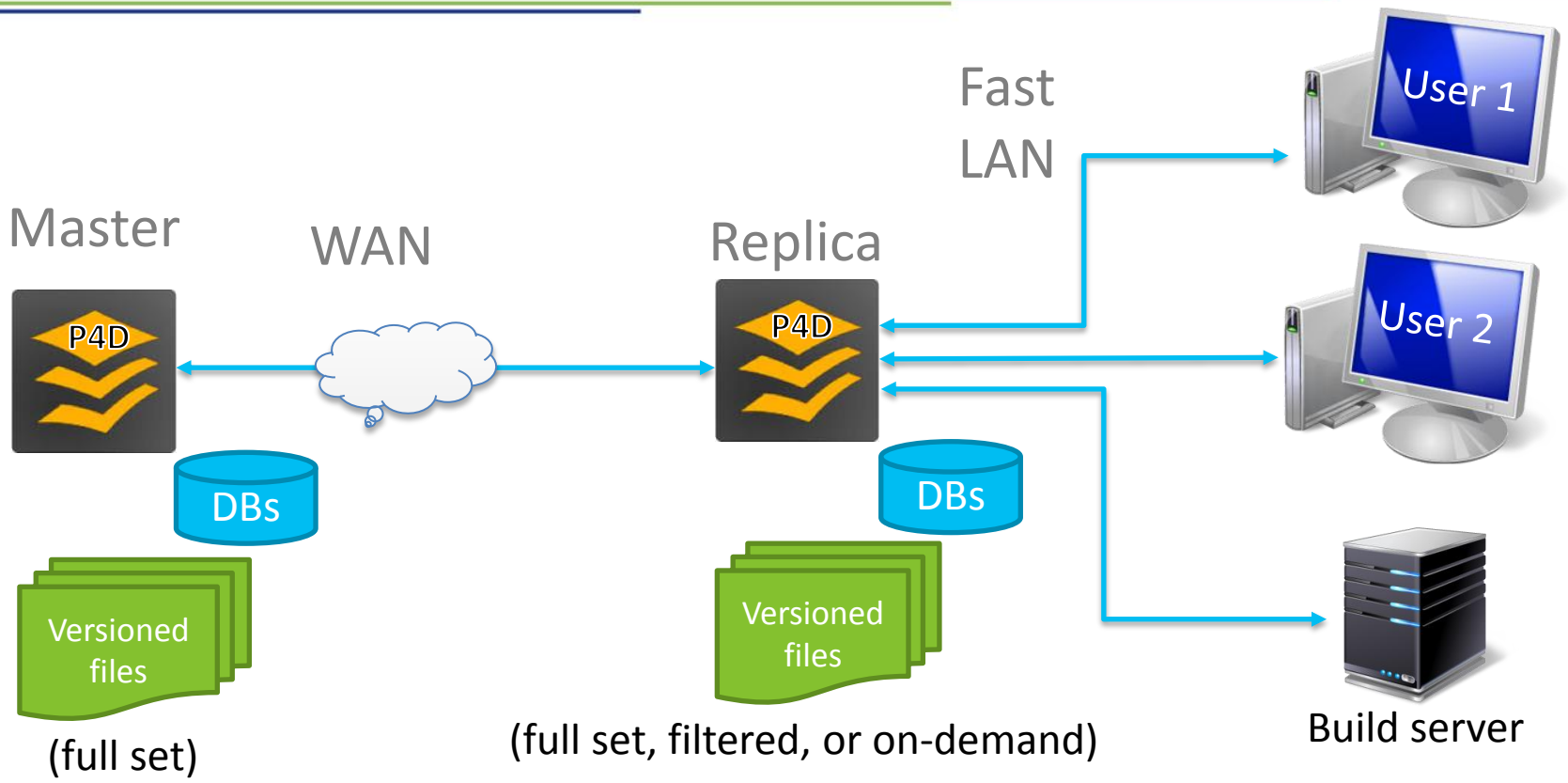
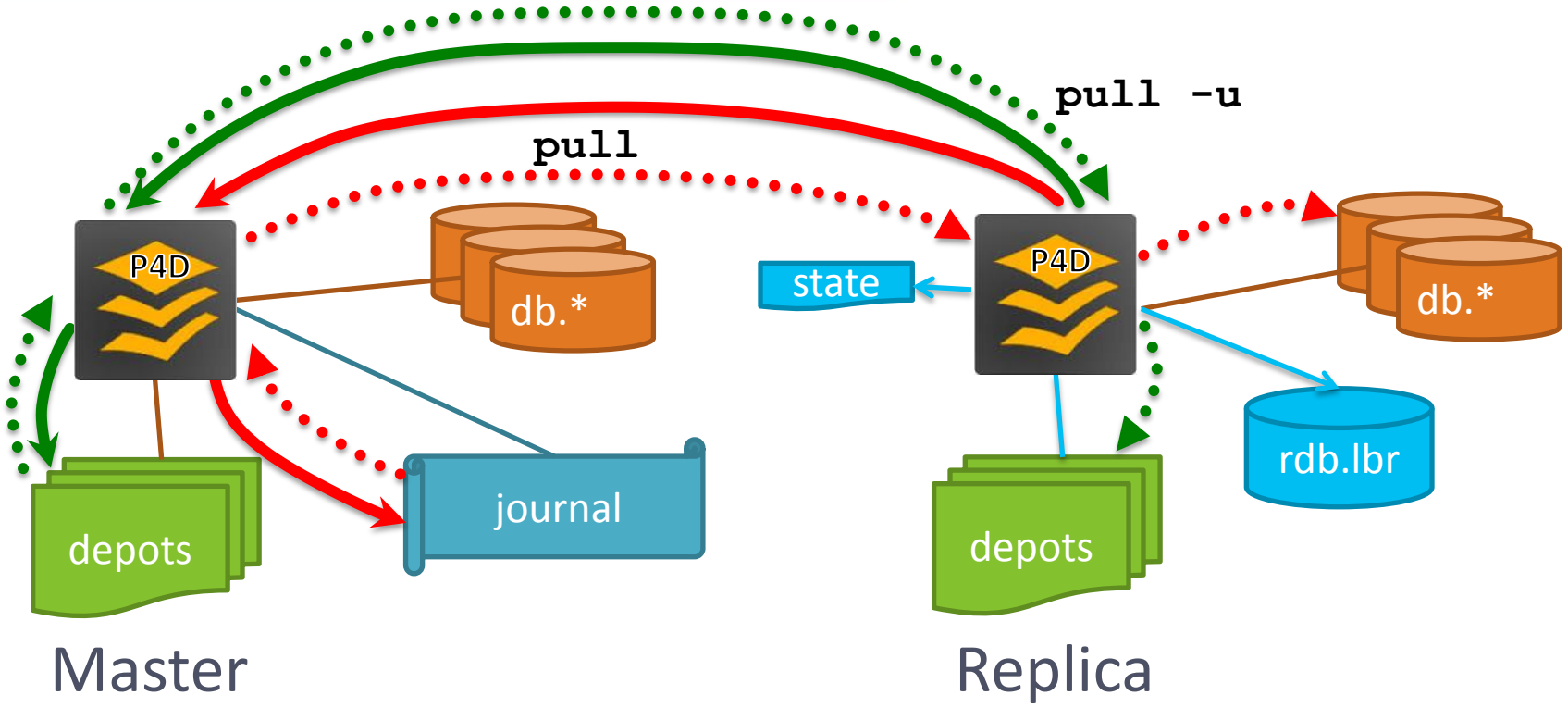
- Server-to-Server replication
  - Asynchronous based on journal file
  - Supports both Metadata-only and Full Replication
  - No need for external scripts, complete solution

- Replicas must initially be seeded with a checkpoint (metadata).
  - Versioned files are required for full replication
    - Can be copied after setup using Perforce replication

Replication Architecture – General



Replication Architecture – Detailed



Naming Servers

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- All Perforce servers should be named and have server specifications
- Server names…
  - Are used in replication and failover and other scenarios
  - Define server capabilities
  - Determine which configurables apply to a server
  - Enforce security
    - Can require special service accounts for access by remote servers

Naming Servers

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- `p4 serverid [serverID]`
- `p4d -xD [serverID]`
  - Sets/retrieves server.id file in server's root directory
- Tells server which configurables apply

- `P4NAME`
  - Environment variable
  - Overrides server.id file

Configurables and Named Servers

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- `p4 configure set replica#P4TARGET=192.168.1.1#1666`
- `p4 configure show`
  - Shows running configuration of queried server
- `p4 configure show allservers`
  - Shows stored configurables for all servers
- `p4 configure show replica`
  - Shows configurables stored in queried server for server named ‘replica’

Configurables and Named Servers

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```
> p4 configure show
P4ROOT=. (-r)
P4PORT=9876 (-p)
P4JOURNAL=journal (default)
threadingmode=true (-d)
p4zk.log.file=p4zk.log (default)
auth.default.method=perforce (default)
>
> p4 configure show replica
replica: P4TARGET = 127.0.0.1:9876
replica: P4TICKETS = /path/to/replica/.p4tickets
replica: db.replication = readonly
replica: lbr.replication = readonly
replica: startup.1 = pull -i 1
replica: startup.2 = pull -u -i 1
```

Server Specifications

- `p4 server servername`
  - Creates or updates information about a server
  - Specifies information about a server such as its type

Type	Definition
standard	Standard Server
replica	Replica Server
broker	P4Broker
proxy	Perforce Proxy
forwarding-replica	Smart Proxy
build-server	Build Server
P4AUTH	Authentication Server
P4CHANGE	Change Server

p4 pull

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- Runs as a background task inside the replica

Command	Effect
`p4 pull`	Retrieve missing journal entries, then terminate
`p4 pull -i <N>`	Continuously pull every <N> seconds
`p4 pull -u`	Retrieve missing file revisions, then terminate
`p4 pull -u -i <N>`	Continuously pull file revisions
`p4 pull -l`	List missing file revisions or errors
`p4 pull -l [-j | -s]`	Replica reporting

- `p4 pull -lj` Shows metadata replication status
- `p4 pull -ls` Shows content transfer status

How does ‘p4 pull’ keep track?

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- **state** file
  - Text file normally located in the replica P4ROOT directory
  - `journal#/offset`
  - Allows replication to be interrupted
  - Master server can rotate journal file
    - Configure journalPrefix if master uses journal prefix for checkpoints

- **rdb.lbr** database
  - Binary file located in the replica P4ROOT directory
  - Contains information on missing archive revisions

Journal rotation and Prefix

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- **Master**
  - `p4 admin checkpoint/journal [-Z] prefix`
  - Do not use –z, use –Z (uppercase)
    - Compresses checkpoint but not rotated journal file
  - If you use a prefix, use the same prefix for ‘p4 pull’
    - Use ‘journalPrefix’ configurable (or pull -J)
- **Replica**
  - `p4 pull [-J prefix] [-i n]`
  - Journal will be rotated in sync with the master

journalPrefix

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- Specify journalPrefix on the master to
  - Simplify checkpoint and journal rotation
  - Avoid having to specify ‘p4 pull –J prefix’ in the replica(s)

- Specify journalPrefix in the replica to
  - Automatically rotate journal to correct location when master rotates
  - Help to prevent replica running out of disk space
  - Without journalPrefix, replica will rotate journal in P4ROOT

```
p4 configure set replica#journalPrefix=/replica/checkpoints/repl_1
```

Configuration

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- ‘p4 pull’ is designed to be a background process
  - Started from the replica server
  - One process for retrieving metadata
  - Several additional processes to retrieve archive data

- Use ‘p4 configure set’ for named servers

```
p4 configure set P4NAME#variable=value
p4 configure set repl_1#P4TARGET=192.168.1.1:1666
```

Prepare in the Master

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```
> p4 configure set monitor=1
For server 'any', configuration variable 'monitor' set to '1'

> p4 configure set Master#net.tcpsize=512k
For server 'Master', configuration variable 'net.tcpsize' set to '512k'
> p4 configure set Repl_1#P4TARGET=master:1666
For server 'Repl_1', configuration variable 'P4TARGET' set to 'master:1666'
```

Prepare in the Master

server.id=Master

checkpoint

server.id=Repl_1

restore

`p4 configure show allservers`

```
Any: monitor=1
Master: net.tcpsize=512k
Master: lbr.bufsize=64k
Repl_1: P4TARGET=master:1666
Repl_1: serviceUser=service
Repl_1: db.replication=readonly
Repl_1: lbr.replication=readonly
Repl_1: startup.1=pull -i 0
Repl_1: startup.2=pull -i 1 -u
```

`p4 configure show allservers`

```
Any: monitor=1
Master: net.tcpsize=512k
Master: lbr.bufsize=64k
Repl_1: P4TARGET=master:1666
Repl_1: serviceUser=service
Repl_1: db.replication=readonly
Repl_1: lbr.replication=readonly
Repl_1: startup.1=pull -i 0
Repl_1: startup.2=pull -i 1 -u
```

server.id determines which configuration is active

Server environment settings

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- Command line flags
- Configure set/cset
- Environment variables
- (On Windows) registry variables

Configuration parameters

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Parameter	Sample Values
P4TARGET	master:1666
db.replication	readonly
lbr.replication	readonly
rpl.forward.all	1
serviceUser	replica_1_svc
startup.1	pull –i 0
startup.2	pull –u –i 1
startup.3	pull –u –i 1

Service user

- Replication requires user of type `service`.
- The service user requires ‘super’ access.
- Add the user to a group (e.g. service.g) group with unlimited timeout.

- On replica machine login as the service user before starting replication
  - Define P4TICKETS location for the replica

```
p4 set -s P4TICKETS=c:\p4\p4tickets.txt
p4 -u p4admin login service_user
```

Active Replication Monitoring

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- `p4 pull -l [-j|-s]`
  - Reports pending transfers
- `p4 verify [-t]`
  - Option -t schedules content transfer of missing/damaged revision
- `p4 journaldbchecksums`
  - Run on master, check log on replica

Simple replica setup - master

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- Set up the replica environment on the **master** server
- Create a replica service user:
  - `p4 user -f replica_svc_user`
  - Add **`Type: service`** to the spec and save it
  - `p4 passwd replica_svc_user`
- Create a server specification:
  - `p4 server rep_1`
  - Add **`Services: forwarding-replica`** to the spec and save it

Simple replica setup - master

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- Set variables for the replica in the master:

```
p4 configure set server=3
p4 configure set rep_1#P4TARGET=192.168.1.1:1666
p4 configure set rep_1#P4TICKETS=/path/to/.p4tickets
p4 configure set "rep_1#startup.1=pull -i 1"
p4 configure set "rep_1#startup.2=pull -u -i 1"
p4 configure set rep_1#db.replication=readonly
P4 configure set rep_1#lbr.replication=readonly
```

Simple replica setup - master

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- Verify settings on master:

```
> p4 configure show rep_1
rep_1: P4TARGET = 192.168.1.1:1666
rep_1: P4TICKETS = /path/to/replica/.p4tickets
rep_1: db.replication = readonly
rep_1: lbr.replication = readonly
rep_1: startup.1 = pull -i 1
rep_1: startup.2 = pull -u -i 1
```

- All okay? Take a checkpoint of the master:

```
p4 admin checkpoint -Z
```

Simple replica setup - replica

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- Copy the checkpoint to the replica and restore
- Create the server.id file on the replica:

```
p4d -r . -xD rep_1
Perforce server info:
        Server ID: rep_1
```

- Log into the master from replica

```
p4 -p 192.168.1.1:1666 -u replica_svc_user login
```

  - Ensure user's P4TICKETS file points to the same location as the replica's setting
- Start the replica

Simple replica setup - replica

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- Replication is working:

```
> p4 pull -lj
Current replica journal state is:       Journal 2,      Sequence 683.
Current master journal state is:        Journal 2,      Sequence 683.
The statefile was last modified at:     2014/10/30 14:27:56.
The replica server time is currently:   2014/10/30 14:28:38 -0700 PDT
>
> p4 -p 192.168.1.1:1666 journaldbchecksums
Perforce server info:
      Table db.config checksums match. 2I li014/10/30 14:33:41 version 1:
expected
Perforce server info:
      Table db.counters checksums match. 2014/10/30 14:33:41 version 1: expecte
Perforce server info:
      Table db.nameval checksums empty. 2014/10/30 14:33:41 version 1: expected
```

Replication *live*

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- Replication really is easy to configure
  - Setup and install of forwarding replica

Exercises

Lab Set E4: Replication

New commands in this chapter:

- `p4 configure set P4NAME#var=val`
- `p4 configure show allservers`
- `p4 pull`
- `p4 pull -l [-j | -s]`
- `p4 journaldbchecksums`
- `p4 verify -t`
- `p4d -xD`
- `p4 server`

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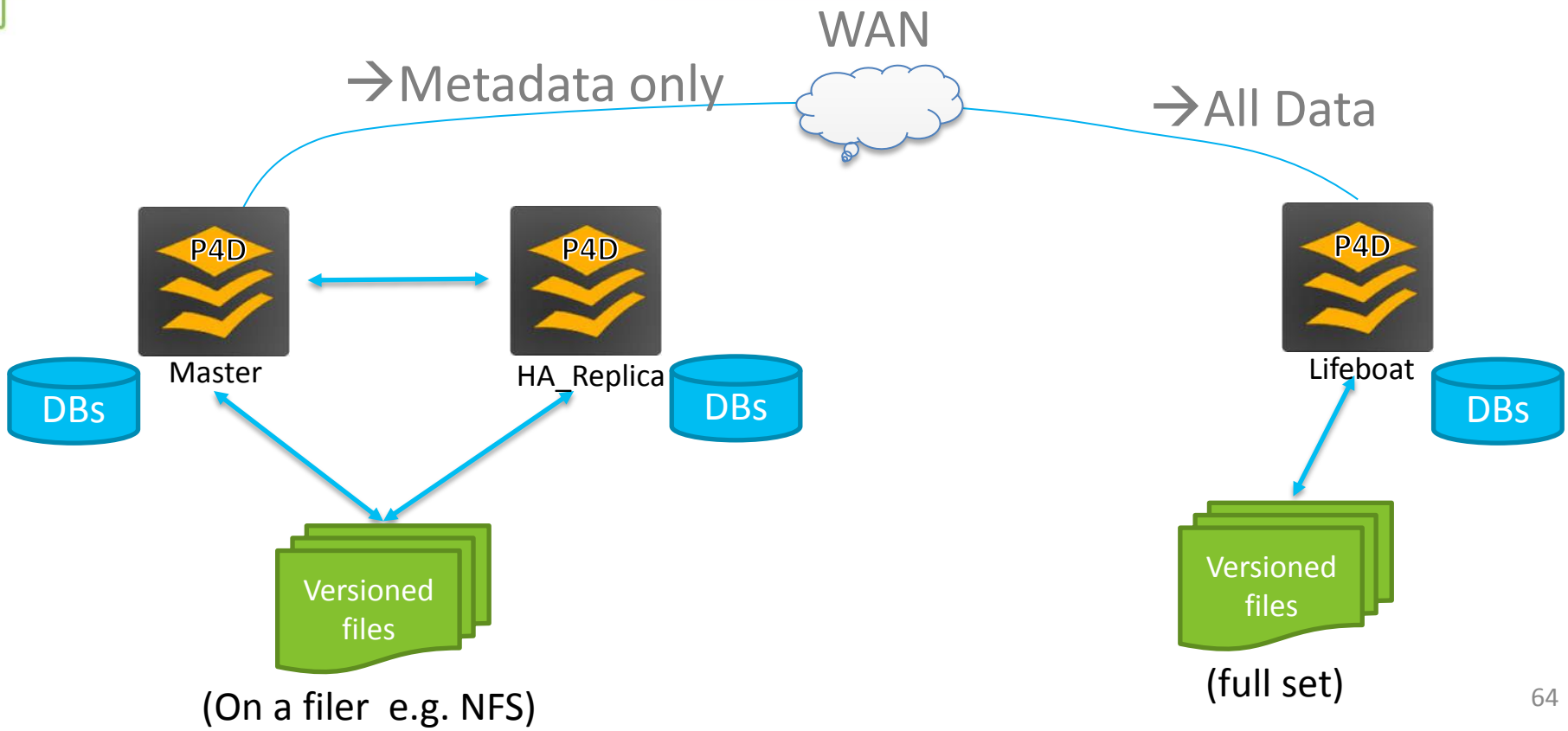
More Replication Options

Replicas for HA and DR



Prepare in the Master

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```
p4 server Replica1

ServerID: Replica1
Name: Replica1
Type: server
Services: forwarding-replica
```

```
p4 configure set Replica1#db.replication=readonly
p4 configure set Replica1#lbr.replication=readonly
```

Equivalent value set via ‘p4 server’ specification:

```
p4 configure set Replica1#rpl.forward.all=1
```

Replica filtering

- To exclude entire tables from a replica:

```
p4 pull -T db.have,db.client
```

- Detailed Filtering:

```
p4 server Replica1
ServerID: Replica1
:
ClientDataFilter:
  -//site2-ws-*
ArchiveDataFilter:
  //....c
  -//....mp4
```

```
p4 configure set
"Replica1#startup.1=pull -i
30 -P Replica1"
```

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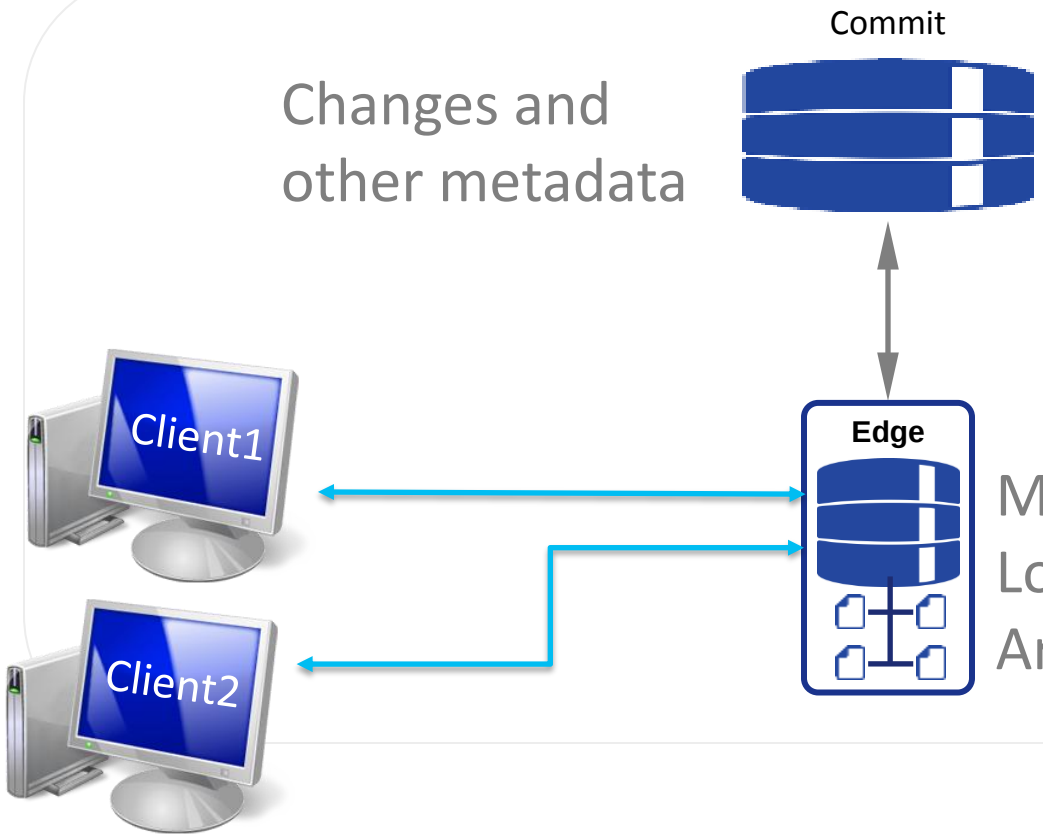
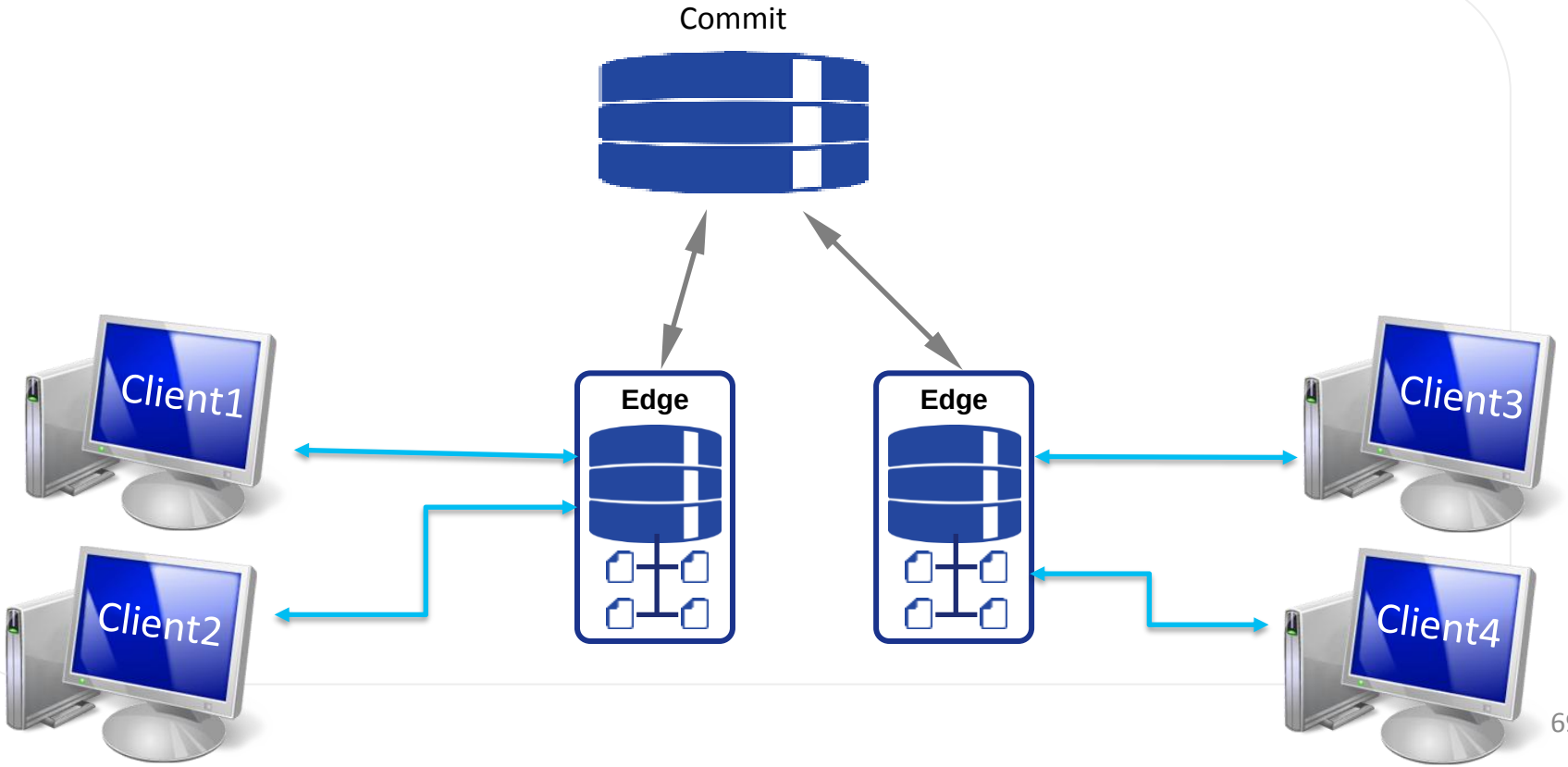
Fully Distributed

Edge/Commit Server Architecture



Edge/Commit Server Architecture



Prepare in the Master

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```
p4 server Edge1

ServerID: Edge1
Name: Edge1
Type: server
Services: edge-server
```

```
p4 configure set Edge1#db.replication=readonly
p4 configure set Edge1#lbr.replication=readonly
```

Equivalent value set via ‘p4 server’ specification:

```
p4 configure set Edge1#rpl.forward.all=1
```

Configuring Edge workspaces

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```
p4 client build-ws-9201
```

```
Client:build-ws-9201
:
ServerID: Edge1
View:
:
```

Edge/Commit Considerations

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- Edge servers contain locally-unique data
  - Generally require backup/recovery
- Information is distributed – you may need to interrogate all edge servers
- Forwarding replicas are simpler
  - Address many needs
  - large db.have is better handled with Edge servers
- Overall user performance is better with Edge servers

- Edge servers used for build farms do not generally require backup

Build-Edge/Commit Considerations

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- Edge servers used for build farms do not generally require backup
- Build data is inherently transient.
- Faster to rebuild from master than to rebuild from scratch
  - Workspaces stored on master
  - ‘Have’ data stored local to Edge
  - Local ‘have’ data not valuable after build is complete

Build-Edge/Commit Server Architecture

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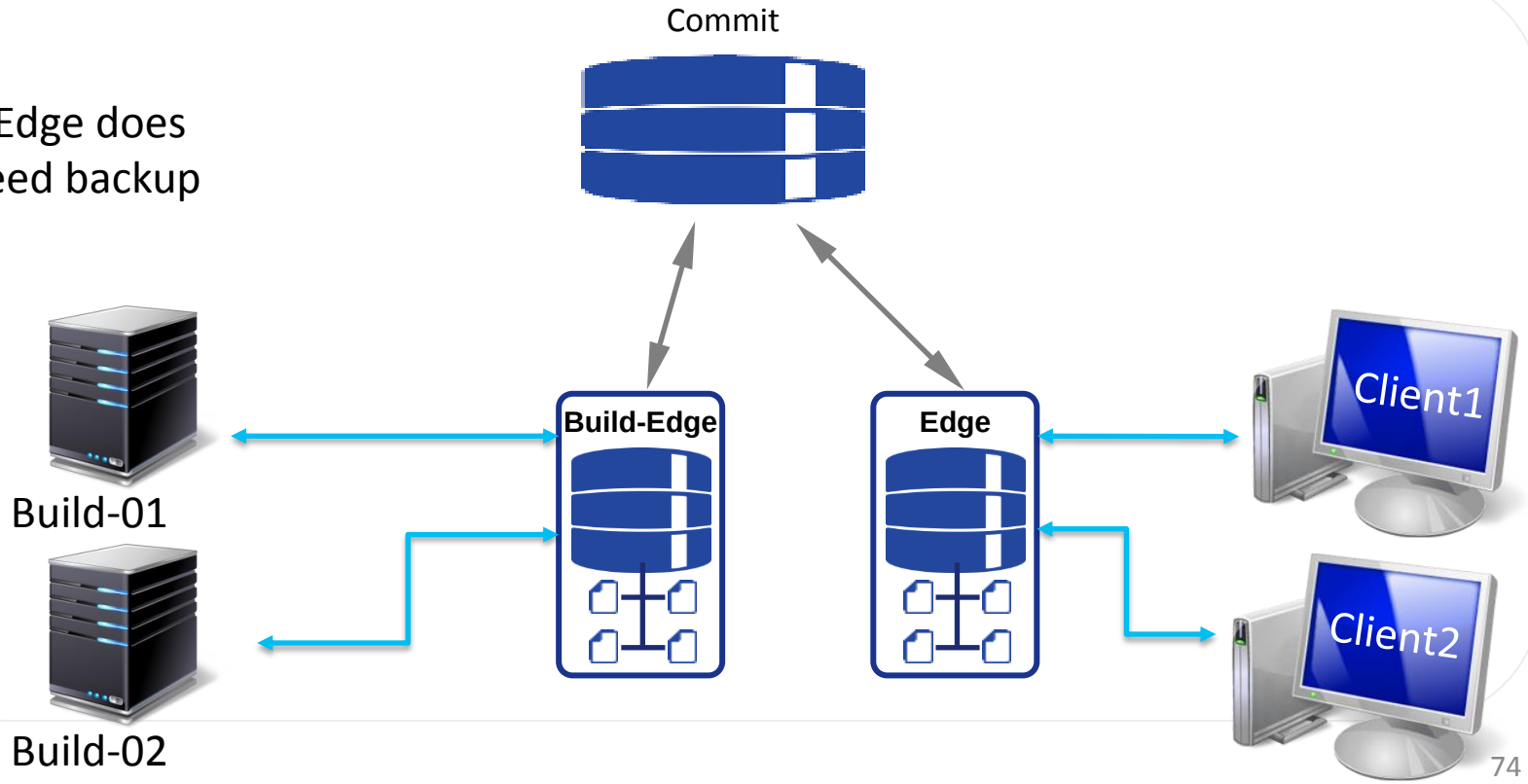
- Build-Edge does not need backup



Exercises

Lab set E5: Forwarding and build replica

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Advanced Enterprise Administration for Perforce

Security

Setting Server Security Level

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- Security settings determine how Perforce Server enforces passwords
- Display security counter value

```
p4 configure show security
security=3 (configure)
```

- Set security counter

```
p4 configure set security=3
```

0	No password required, any password allowed (default)
1	Strong password is required, can be stored in Windows registry
2	Strong password is required, cannot be stored in registry
3	*p4 login* tickets only, no password stored anywhere
4	Level 3 + Edge, replica, proxy & brokers must connect using a service user

Server Security

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- Server security levels (0-4)
  - p4 configure set security=4
- Turn off auto user creation and require authorization to see user list
  - p4 configure set dm.user.noautocreate=2
  - p4 configure set run.users.authorize=1
- Set changelists to restricted by default
  - p4 configure set defaultChangeType=restricted

Connection Protocols

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- TCP
  - Default protocol

```
P4PORT=tcp:p4server:1666
```

- RSH
  - Starts up the server for each request
  - Useful for testing and inetd support

```
P4PORT=rsh:/usr/local/bin/p4d -r $P4ROOT -L $P4LOG -i
```

- SSL
  - SSL encrypted connection when using “ssl:” prefix

```
P4PORT=ssl:p4server:1667
```

RSH connection

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- Starts up a server on client request
- No TCP/IP connection to server
  - Uses stdout/stdin bound to client (with -i option)

- Usage examples:
  - Sidetrack server (specify different log file)
  - Test environments (P4Python, P4Ruby, P4Perl)

SSL Encryption

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- 2012.1+ release support SSL encryption
  - Perforce Server, Perforce Proxy, P4Broker
  - Requires 2012.1+ client (P4, P4V, …)
    - Consider implications with 3rd party integrations
  - If enabled, all clients require SSL connection.
    - Run two P4Ds to offer SSL and non-SSL (one with “ssl:”, one without)
- Client needs fingerprint in its P4TRUST file

```
p4 trust
```

p4 trust

- Client-side command for handling fingerprints
- Uses P4TRUST environment variable (default $Home/.p4trust)

```
p4 trust -h
```

`p4 trust -y`	Accept the fingerprint
`p4 trust -n`	Reject the fingerprint
`p4 trust -f`	Force overwriting of the fingerprint
`p4 trust -l`	List accepted fingerprints
`p4 trust -d`	Delete a fingerprint

SSL Setup

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- P4SSLDIR -> directory with key and certificate

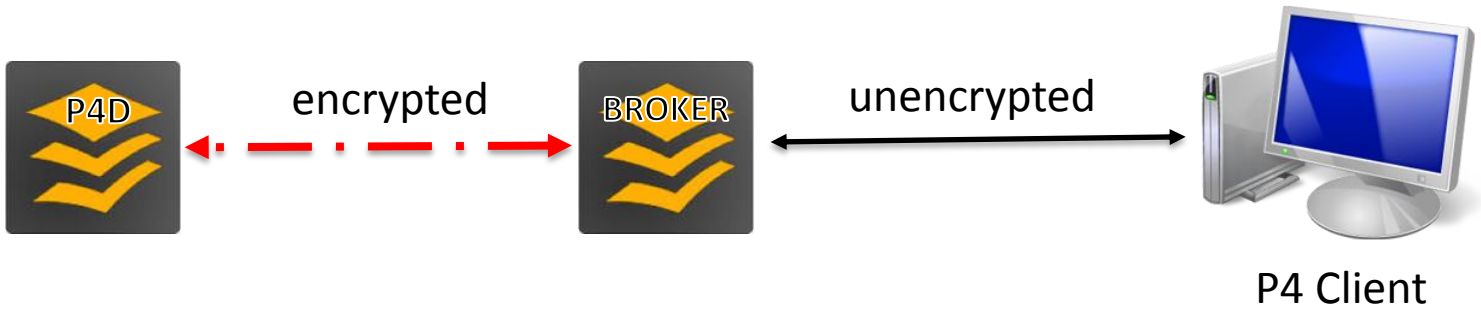
```
cd $P4ROOT
mkdir ssl          # optionally create config.txt
chmod 700 ssl      # drwx------
export P4SSLDIR=ssl
p4d -r . -Gc       # key and certificate
p4d -r . -p ssl:1667
```

- Client needs to accept fingerprint

```
p4 -p ssl:p4server:1667 trust -y
```

Phasing-in SSL encryption with P4Broker

- Use P4Broker
  - P4D runs with SSL encryption enabled
  - P4Broker itself runs unencrypted
  - Allows phasing-in of encrypted connections



Exercises

Lab Set E6: Security

New commands in this chapter:

- `p4d -Gc`
- `p4 trust`

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Advanced Tools

Advanced Tools

PERFORCE
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- perfmerge
- perfsplit
- p4-migrate
- Checkpoint surgery
- Conversions – ftp://ftp.perforce.com/perforce/tools

perfmerge

PERFORCE
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- **Goal**
  - Merge two Perforce Servers into a single Perforce Server

- **Implementation**
  - Perfmerge tool reads both databases
  - Choice on change merging
    - Append
    - Intersperse and order in time
    - Append with offset

perfsplit

PERFORCE
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- **Goal**
  - Extract data from a main server with its exact revision history
  - Split a Perforce Server into two separate Perforce Server

- Implementation
  - Perfsplit reads directly from an existing Perforce Server
  - It uses a splitmap to determine which files are split
    - Same syntax as the label view map
  - Only creates metadata, depot files need to be copied separately

p4migrate

PERFORCE
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- **Goal**
  - Migrate a Perforce Server from a case-insensitive to a case-sensitive platform

- **Implementation**
  - Reads a checkpoint to find case inconsistencies
  - Generates a case-fix map
  - Use the map to correct the checkpoint
  - Once the checkpoint is case-consistent it can be used for migration
  - Tool can also be used to rename depot paths
  - Migration from case-sensitive to case-insensitive is not supported

Checkpoint/Journal Format

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- Text file containing journal records
- Each record has a type
  - Checkpoint only has @pv@ entries
- Strings are surrounded by @ symbol
- Each value record refers to
  - A database table
  - The table version

Record	Type
@pv@	Put value = insert
@dv@	Delete value = delete
@rv@	Replace value = update
@vv@	Verify value = select
@ex@	commit
@mx@	flush
@nx@	Journal note

- http://www.perforce.com/perforce/doc.current/schema/

Log Analysis and Reporting

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- Standard Log
  - Log Analyzer
    - Upload your logs
    - Download our tools
  - Track2SQL
- Structured Logs
- Performance monitoring using the log
- Metrics with P4toDB (replication technology)
- Discovering overall trends

Structured Log

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#	Structured Logs	Description
1	`all`	All loggable events (commands, errors, audit, etc...)
2	`commands`	Command events (command start, compute, and end)
3	`errors`	Error events (errors-failed, errors-fatal)
4	`audit`	Audit events (audit, purge)
5	`track`	Command tracking (track-usage, track-rpc, track-db)
6	`user`	User events; one record every time a user runs p4 logappend.
7	`events`	Server events (startup, shutdown, checkpoint, journal rotation, etc.)
8	`integrity`	Replication errors/events

Structured Logs

- Enable specific structured logs with:

```
p4 configure set serverlog.file.n=logtag.csv
p4 configure set serverlog.maxmb.n=1024
p4 configure set serverlog.retain.n=45
```

- Enabling all structured logging files can consume considerable space and impact performance.
- Structured logs are automatically rotated on checkpoint, journal rotation, exceeding size limit, or when ‘p4 logrotate’ is run.

Conclusion

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- Database schema is public
- There are tools that can use the checkpoint or the database directly
- Handle with care

- Ask Perforce support or consulting if you are not sure

Exercises

Lab Set E7: Structured Logs

New commands in this chapter (samples):

- `p4 configure set serverlog.file.n=errors.csv`
- `p4 configure set serverlog.maxmb.n=30Mb`
- `p4 configure set serverlog.retain.n=45`
- `p4 logappend`
- `p4 logrotate`

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Advanced Enterprise Administration for Perforce

Scripting

Preliminary Decisions

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- Uses of scripts
- Choosing the interface
- Setting Environment Variables
- User Authentication

Uses of scripts

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- Reporting tools
- Daemons and recurring processes
- Wrappers for Perforce commands
- Triggers
- Workflow and policy enforcement
- P4V customization (P4JsAPI)
- P4Broker
- Legacy SCM data import

Typical workings of a script

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- Data processing in batches
  - Retrieve information such as files or changes
  - Process the data in the script
  - Potentially update Perforce
- Form handling
  - Retrieve a form such as a client workspace
  - Modify the form in the script
  - Update the form in Perforce

Workflow and Policy enforcement

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- Triggers
  - Submit/Shelving triggers
  - Authentication triggers
  - Form triggers
  - Archive triggers
  - Fix triggers

- P4Broker
  - Block, redirect or modify commands

Choosing the interface

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- Wrap P4 command
  - \+ Simple solution that will run everywhere
  - \+ Batch scripting built into the OS and requires no installation
  - – Requires parsing of output
- APIs
  - \+ Language-specific integration
  - \+ Extendable
  - \+ Performance (reduced connection overhead)
  - – Requires installation (and/or build/compilation)

API's Available for Scripting

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- Programming Languages
  - C++
  - P4Java
  - Perforce Objective-C
  - Perforce .NET
- Derived APIs (C++ API wrappers)
  - P4Python
  - P4Perl
  - P4Ruby
  - P4PHP

http://www.perforce.com/product/components/apis

Wrapping the command line client P4

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- Command line returns lines of text

```
p4 describe -s 13
Change 13 by sknop@alita on 2010/03/02 12:58:51

 Branching foo from bar.
 Test branch only.

Affected files ...

... //depot/tests/foo#1 branch
```

Capture errors, warnings and messages

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- Use -s to precede each output line with “info” or “error”

```
p4 -s sync ...
info: //depot/foo#3 - updating /client/foo
error: Can't clobber writable file /client/foo
exit: 1
```

Tagging output: Command line and API

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- Format output by using -ztag

```
p4 -ztag clients
... client bruno_ws
... Update 1104271684
... Access 1104340062
... etc.
```

- Perforce API based on tagged data output

Form handling: bypassing an editor

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- Redirect to standard output

```
p4 change -o
```

- Read from standard input

```
p4 submit -i
```

- Submit without invoking an editor

```
p4 submit -d "Fixed off-by-one error."
```

- Example: Create a client workspace without invoking an editor

```
p4 client -o | p4 client -i
```

Setting the environment for scripts

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- Command line flags

```
p4 -p server:1666 -u script_user -c script_ws info
```

- P4CONFIG (next slide)
- Environment and registry variables

- Recommendation:
  - Use P4CONFIG
  - Set P4CONFIG in the scripts to make sure it is set in the environment
  - This will keep scripts independent of Perforce Server and location

P4CONFIG

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- P4CONFIG points to a file name

```
p4 set P4CONFIG=P4Config.txt
export P4CONFIG=/p4/scripts/.p4config
```

- File usually located in the workspace root or scripts folder

- File contains the Perforce variables

```
P4PORT=server:1666
P4CLIENT=script_ws
P4USER=script_user
```

User authentication for scripts

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- `p4 login`
  - Works for all Perforce Server security levels
  - Works if Perforce is integrated with AD
  - Works if Perforce is integrated with SSO

- Either: Store password in local (hidden/restricted access) file

```
p4 login < /p4/scripts/.password
```

- Or: Use ever-lasting ticket (ideally with separate P4TICKETS file)

Use a group to extend session

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```
p4 group scripts
```

```
Group:    scripts
MaxResults:     1000000
Maxscanrows:    5000000
MaxLockTime:      30000
Timeout:      unlimited
Subgroups:
Owners:
                bruno
Users:
                script_user
```

P4TICKETS

- P4TICKETS points to a ticket file

```
export P4TICKETS=/p4/scripts/.script_p4tickets
```

- Important when scripts may be run as a different user (default value is home directory which is different per user)
- This will provide safety from someone accidently logging out a script user
  - Beware of p4 –u script_user logout –a
    - Invalidates all tickets for this user

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Questions?

The End

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