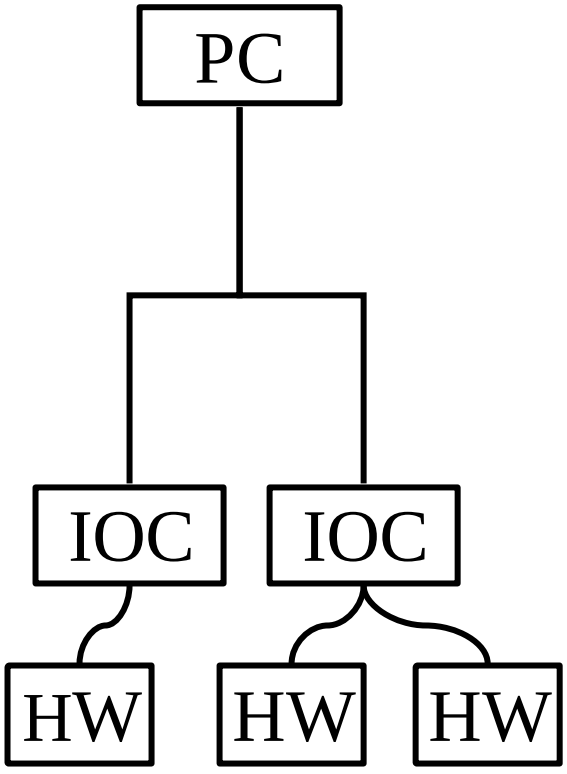
Channel Configuration Management

Andreas Lüdeke

Swiss Light Source, PSI

- Introduction
- Design
- Implementation & Performance
- Usage & Outlook

Introduction

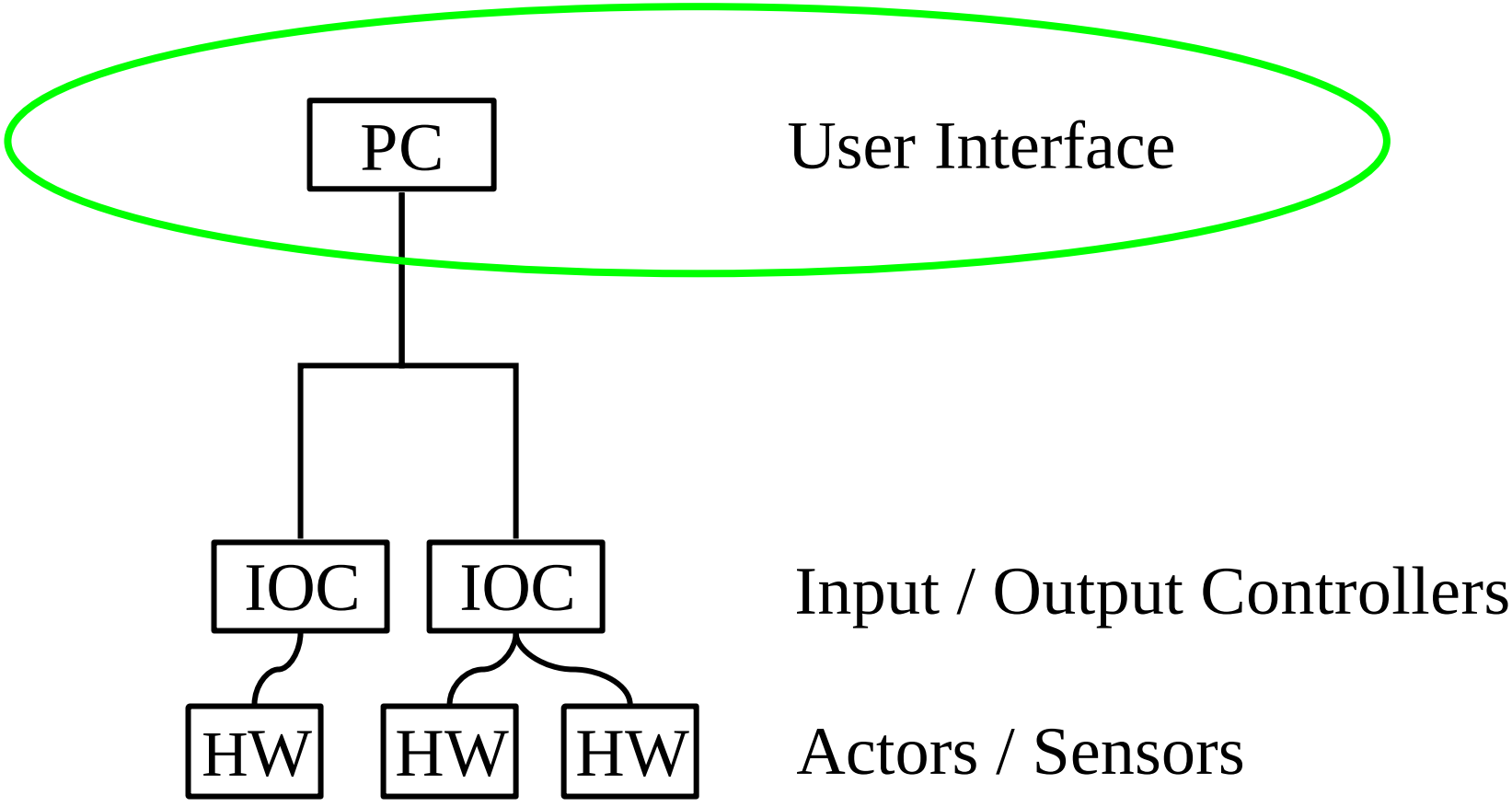


User Interface

Input / Output Controllers

Actors / Sensors

Introduction



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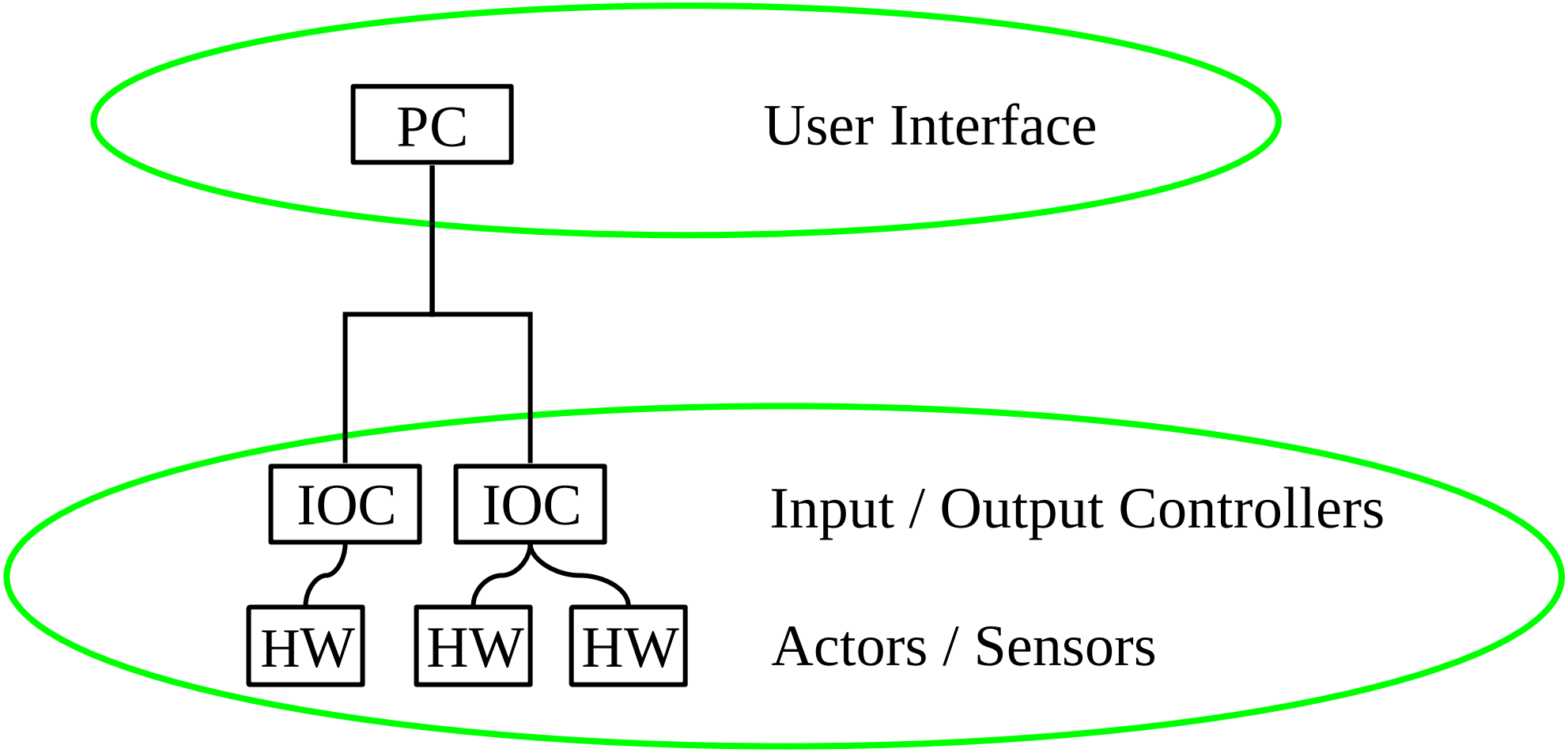

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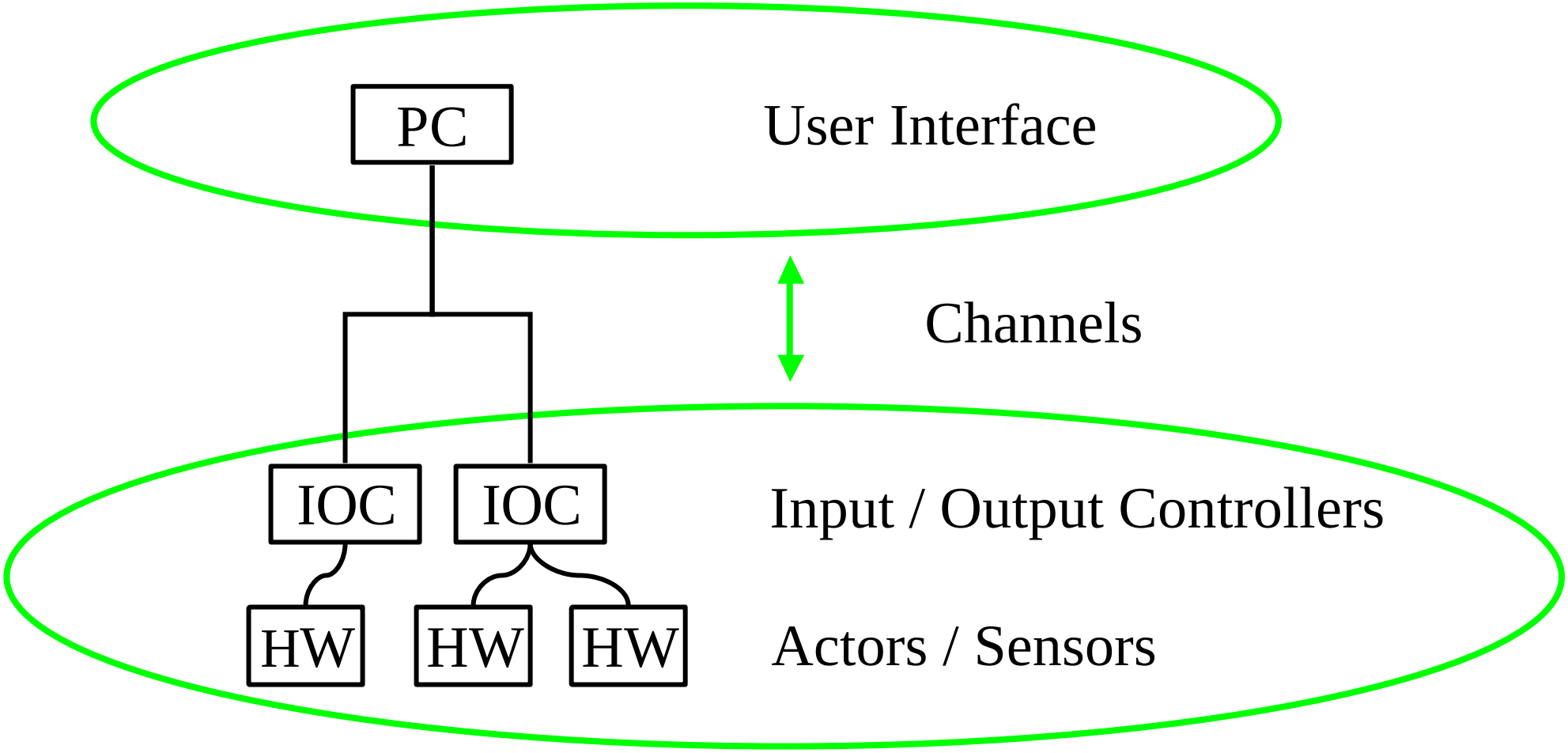

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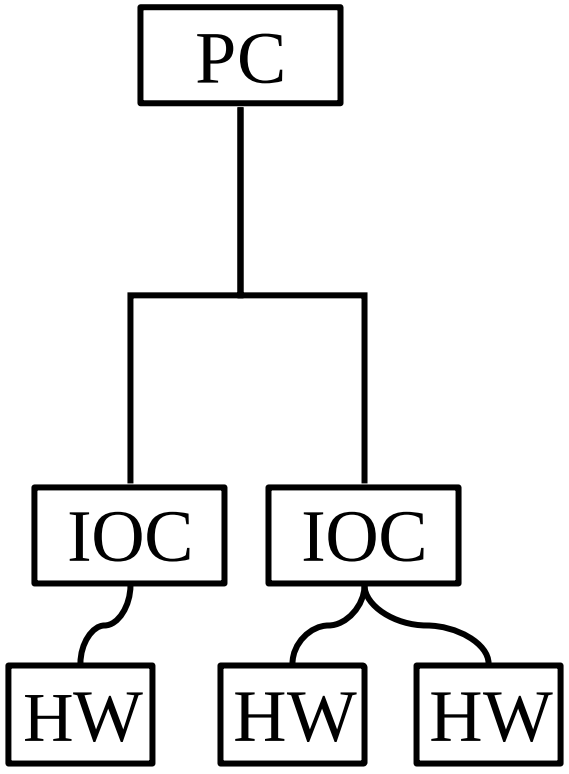

Client Applications

a b c

Configuration

- Display Configuration
- Machine Model
- ...
- Channels

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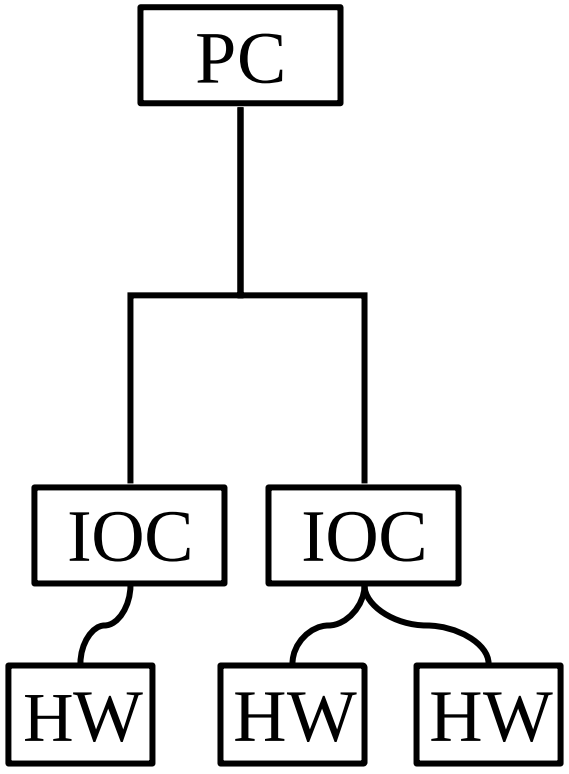

Client Applications

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Server Applications

x y z

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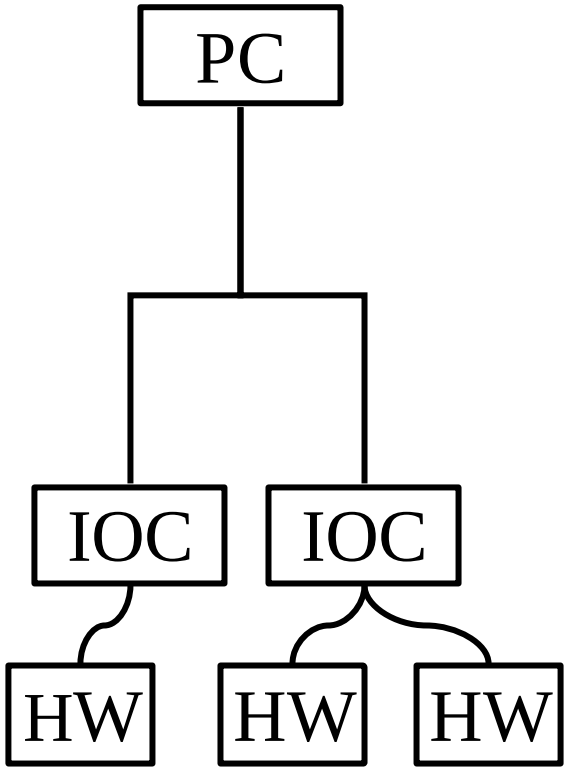

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Identical?

- Channels
- ...
- Procedures
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„Ideal“ Design

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Server

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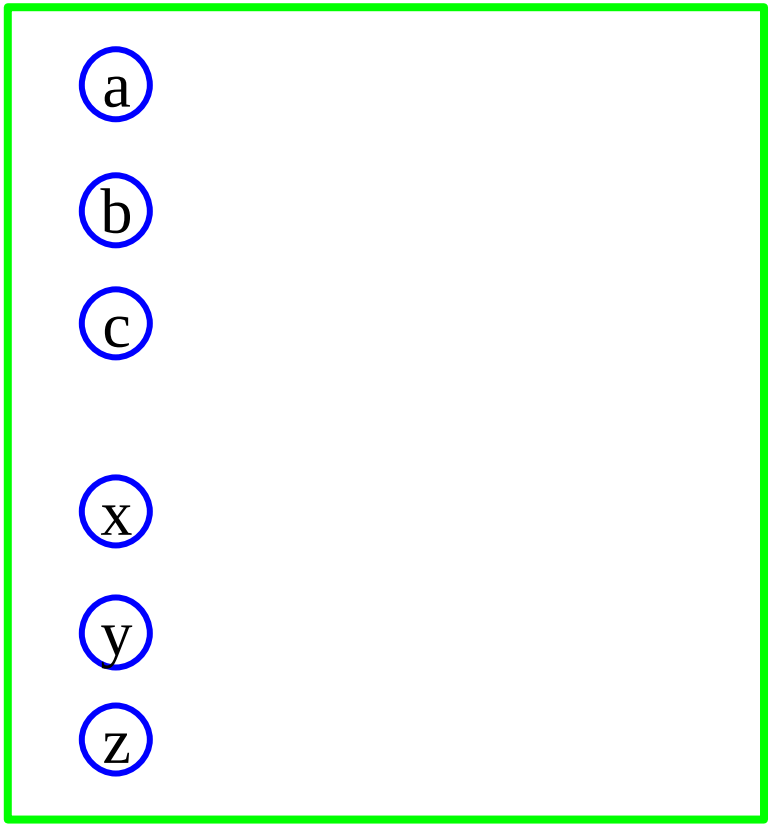
- Procedures
- Hardware Configuration



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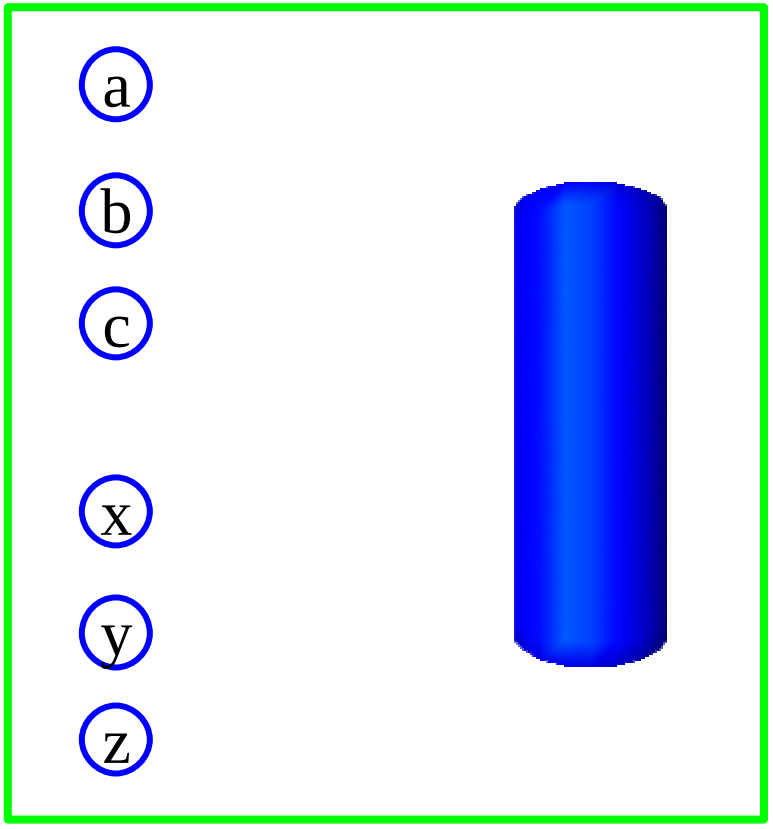

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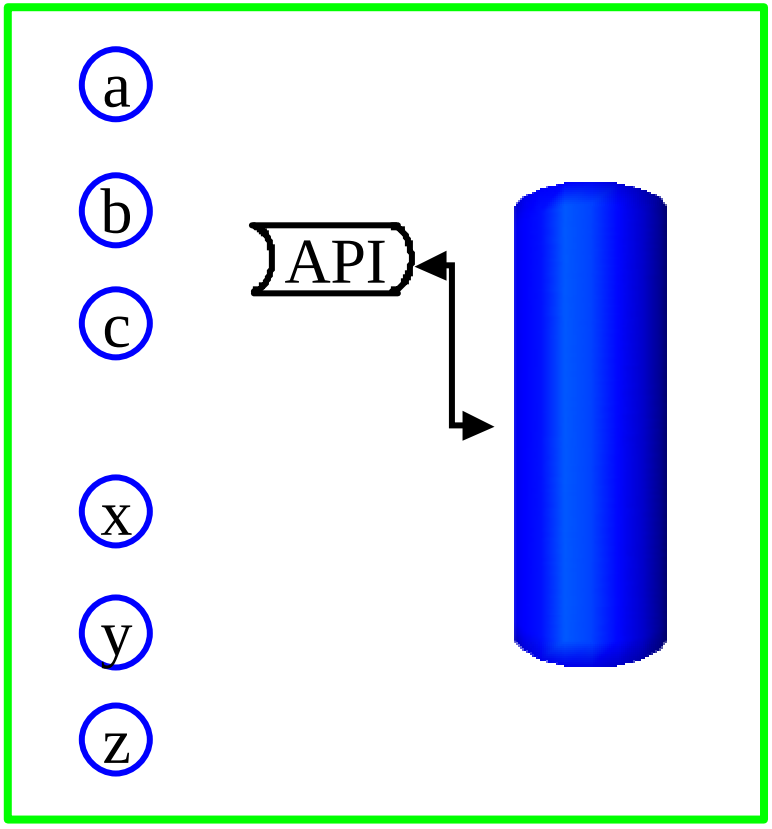

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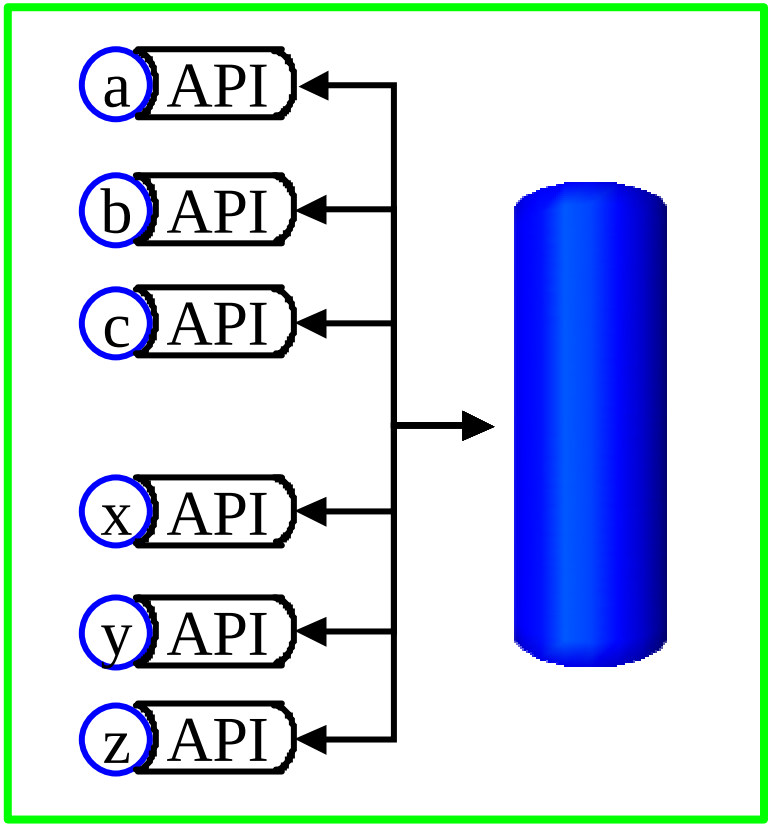

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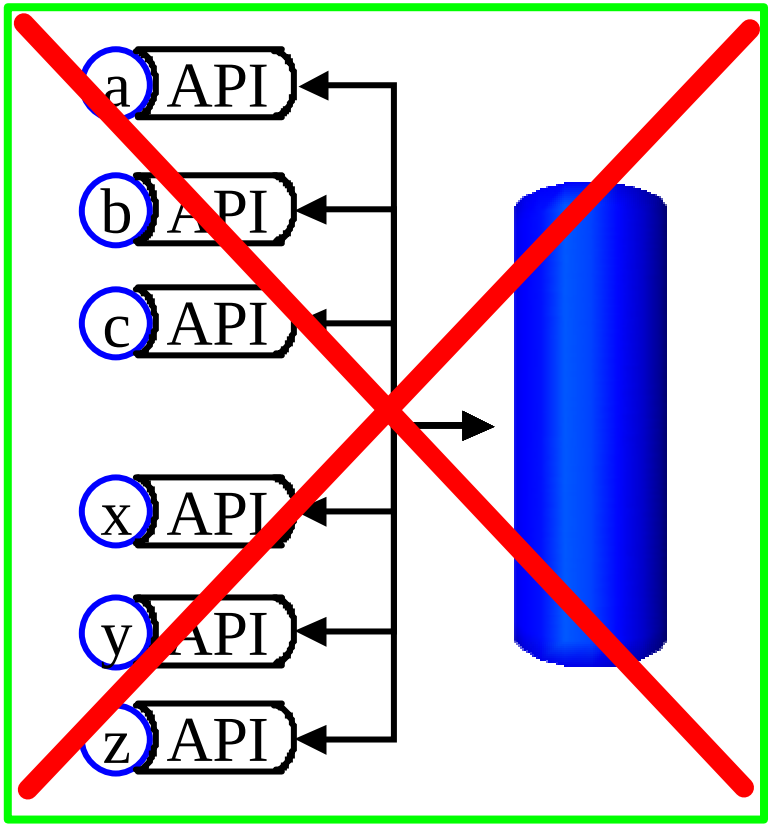

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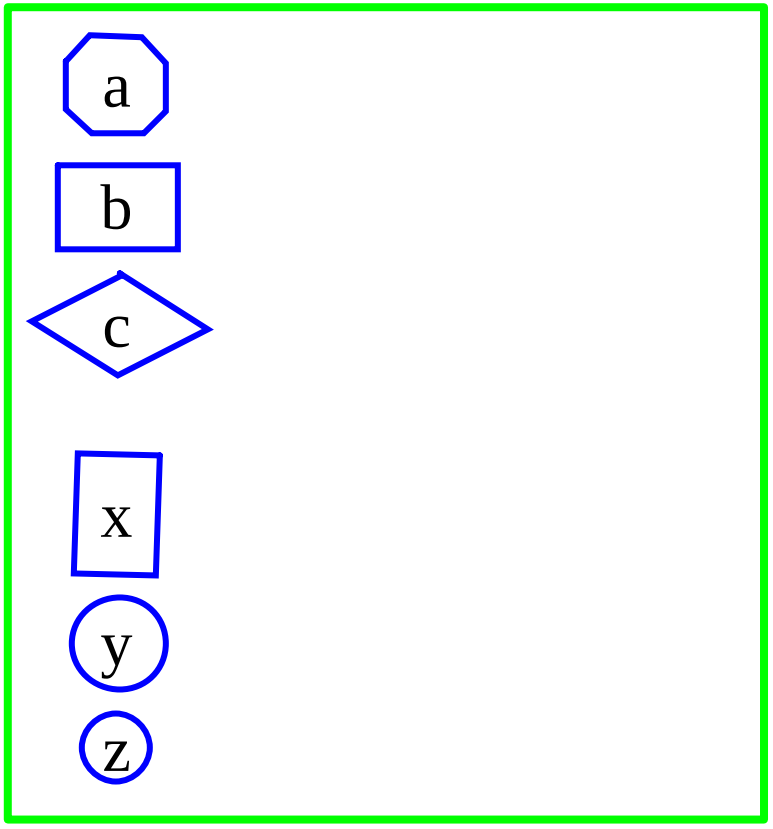

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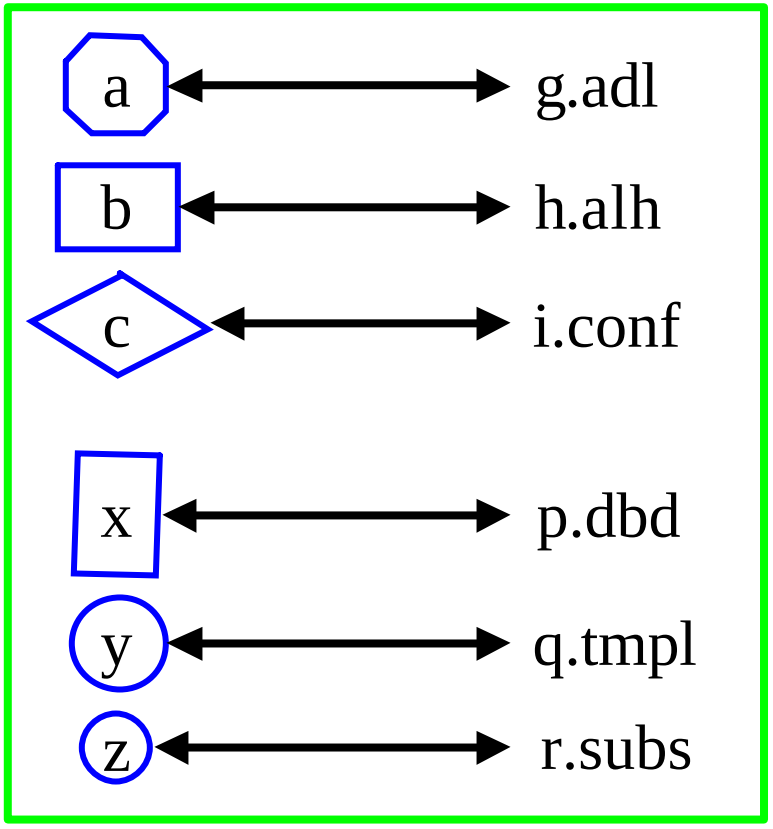

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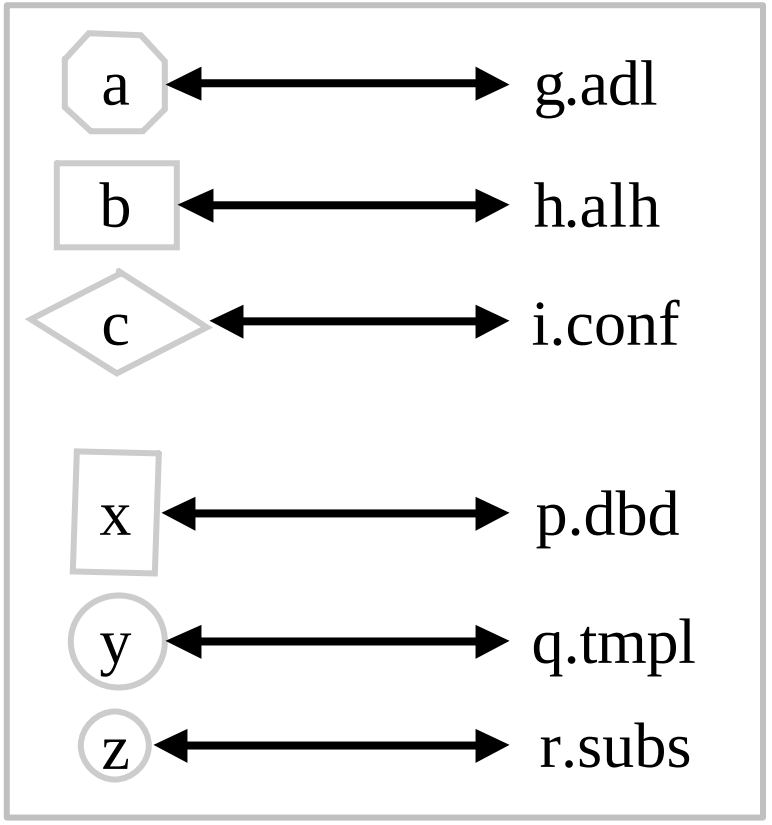

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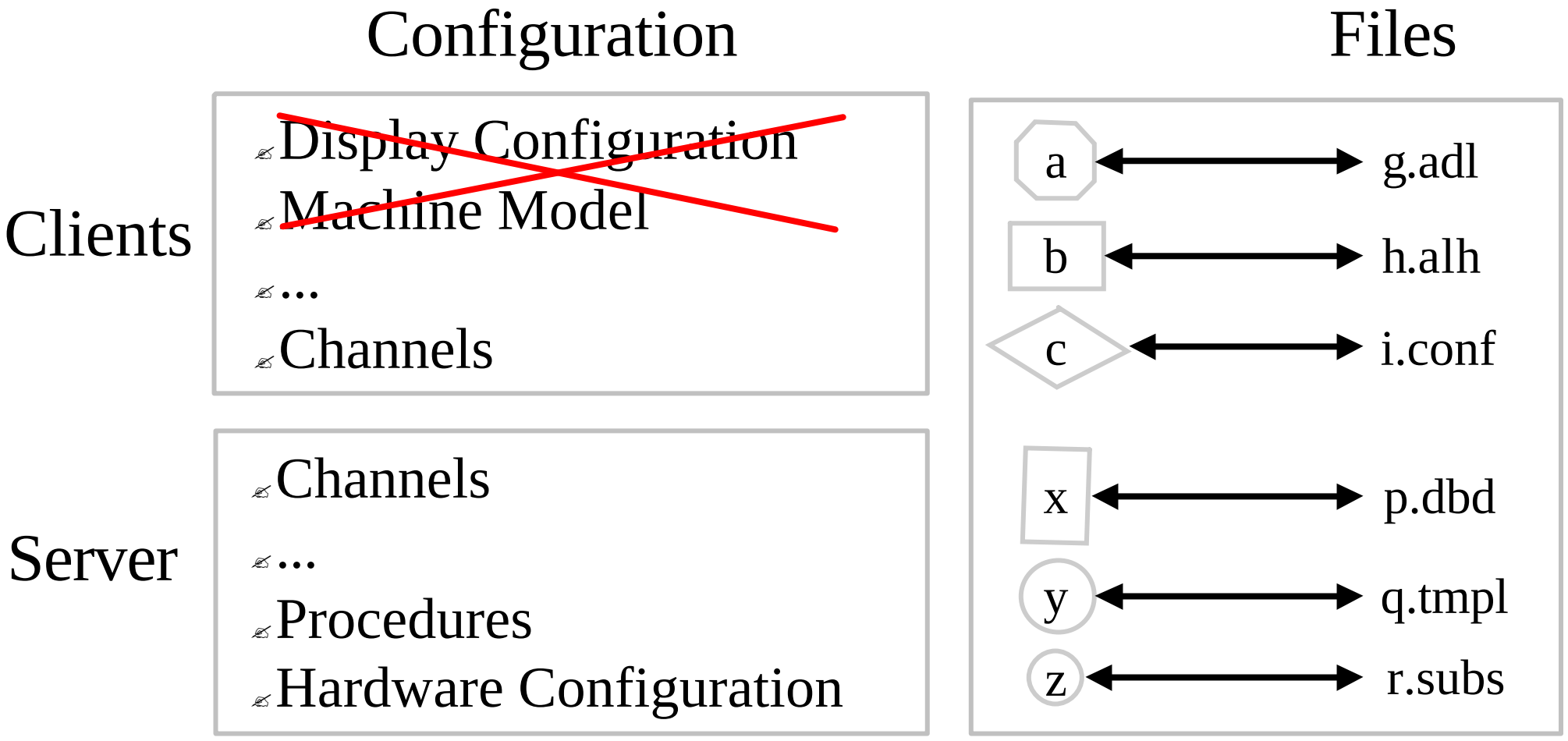

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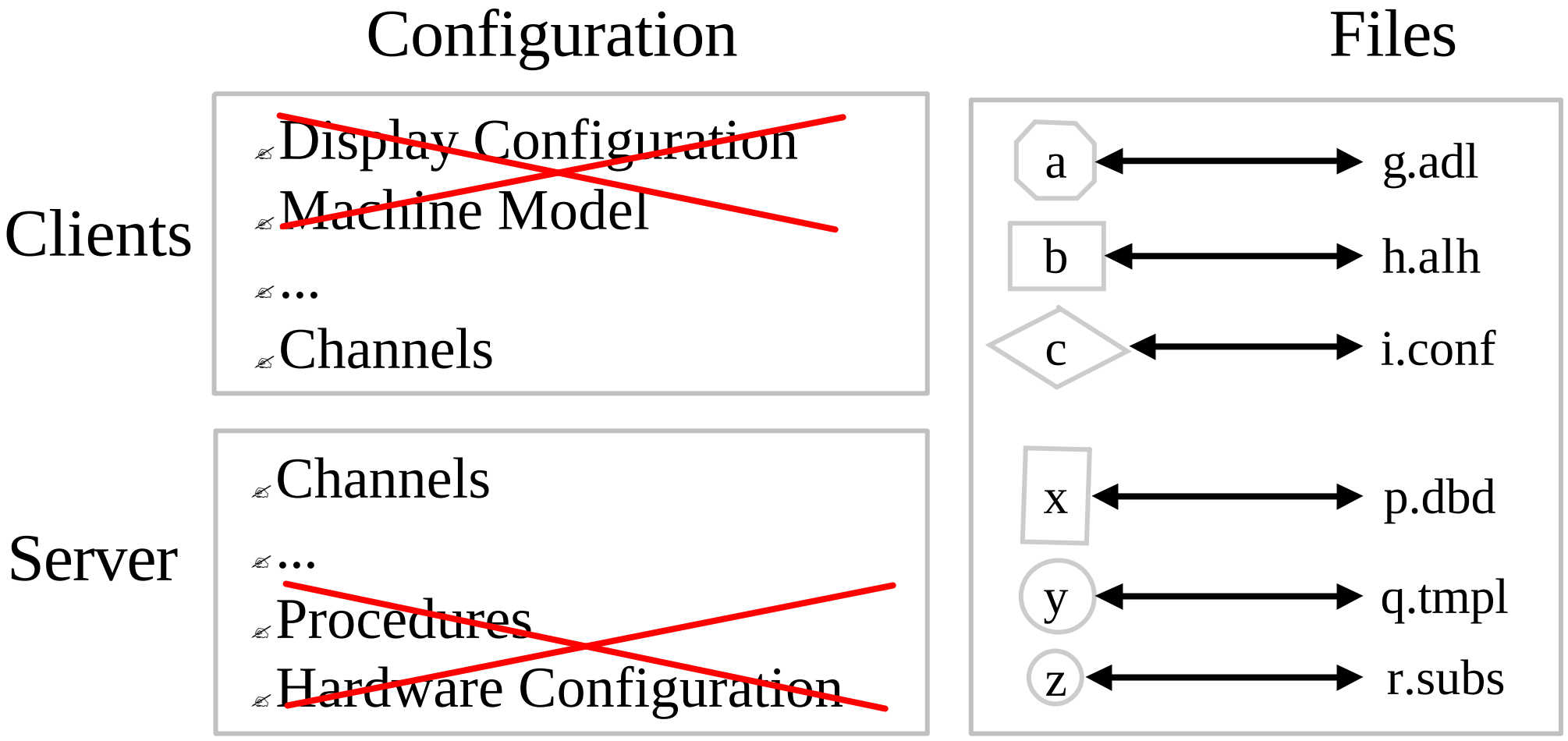

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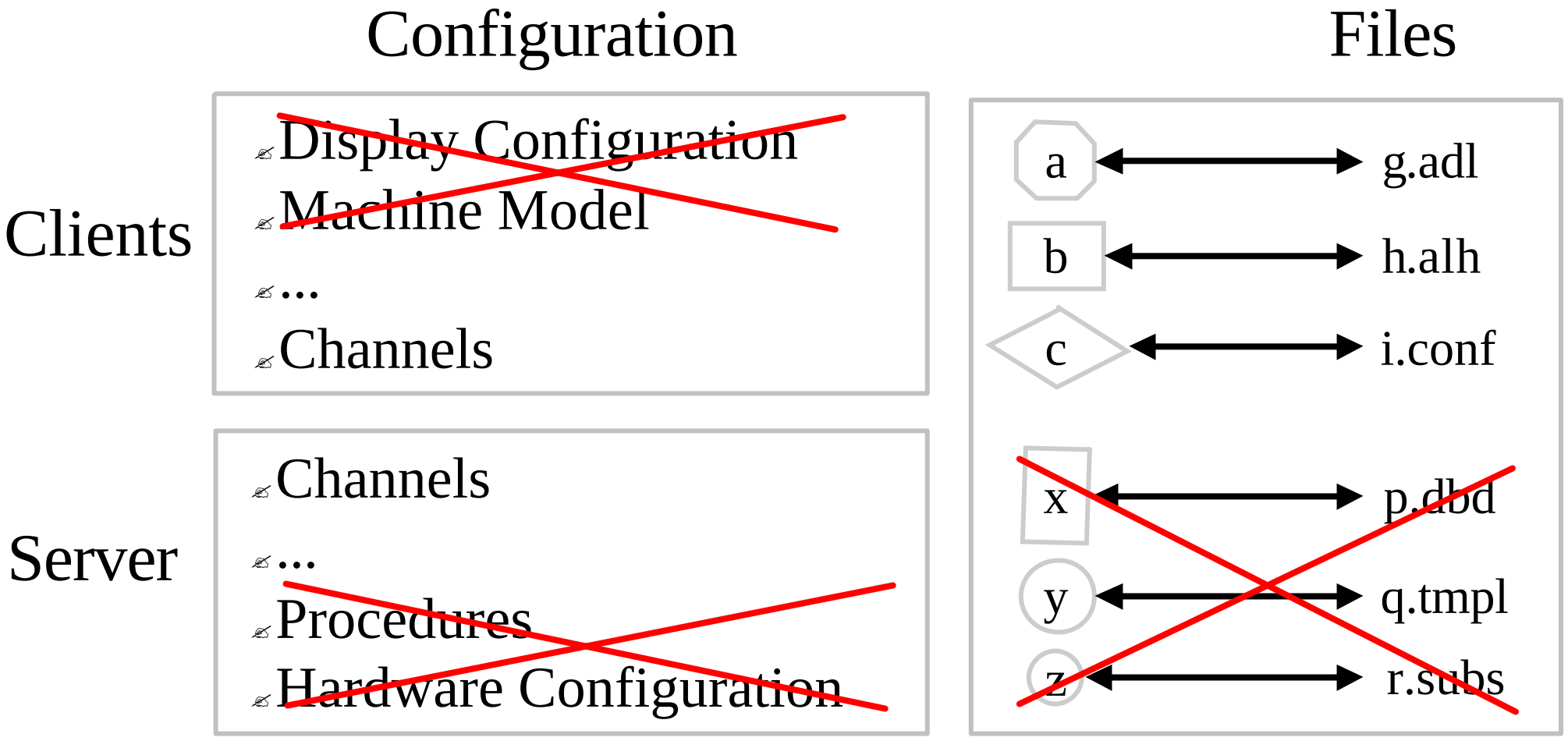

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Config. Files

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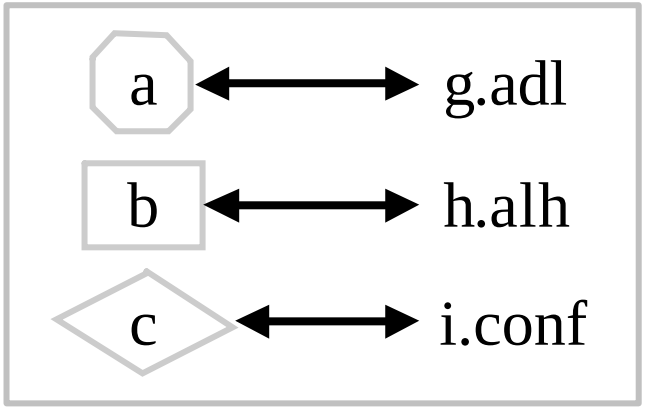


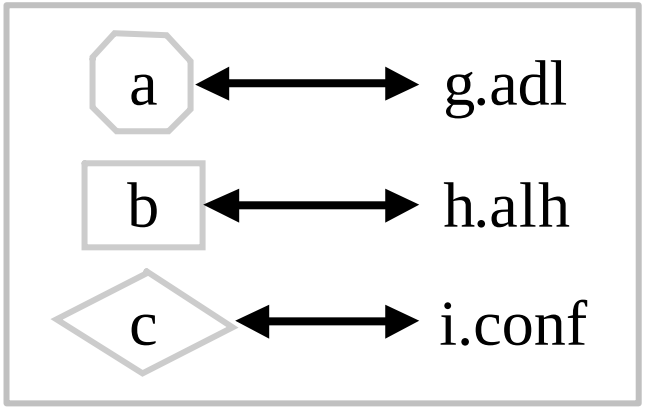
Server

EPICS IOCs

„EPICS“ Design

Config. Files

Clients



- GUI builder (medm/dm2k, ...)
- Archiver
- Save and Restore
- Alarmhandler
- Striptool
- Inhouse build applications, ...

Server

EPICS IOCs

„EPICS“ Design

Clients

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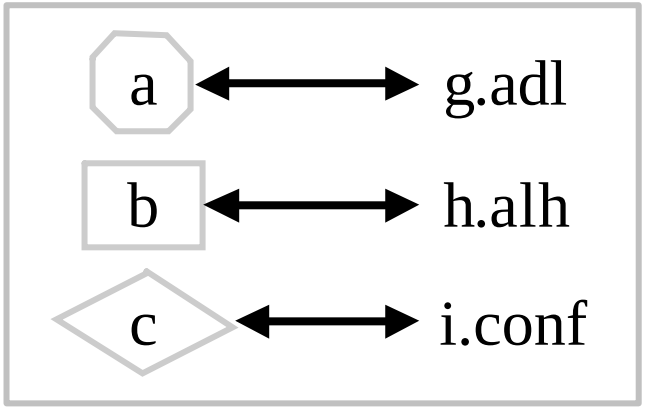

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Server

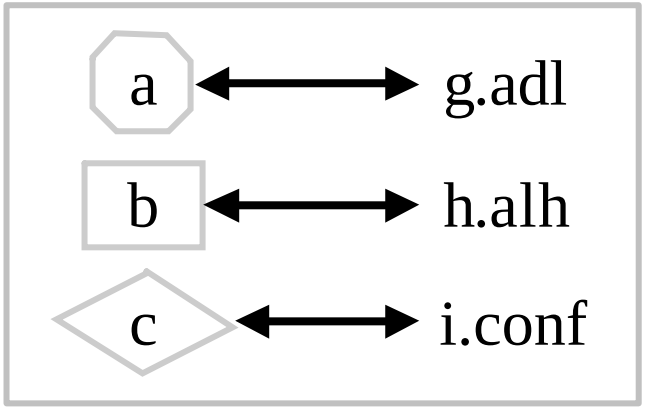
EPICS IOCs

- EPICS „process database“:
  channel = record + `.´ + field
- Def. set of fields per record type
- SLS naming convention:
  record = device + `:´ + property

„EPICS“ Design

Config. Files

Clients



Server

EPICS IOCs

„EPICS“ Design

Config. Files

Database

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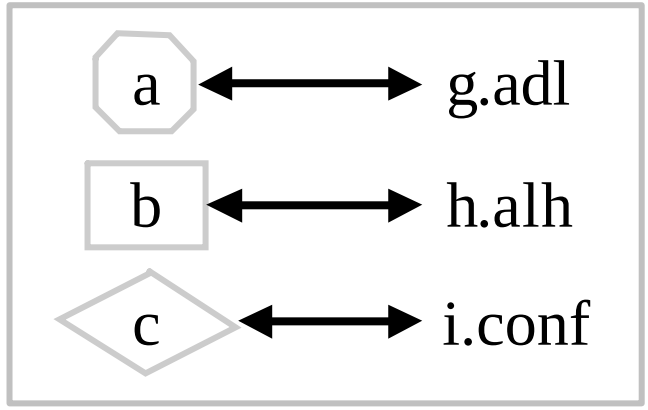

Server

EPICS IOCs

„EPICS“ Design

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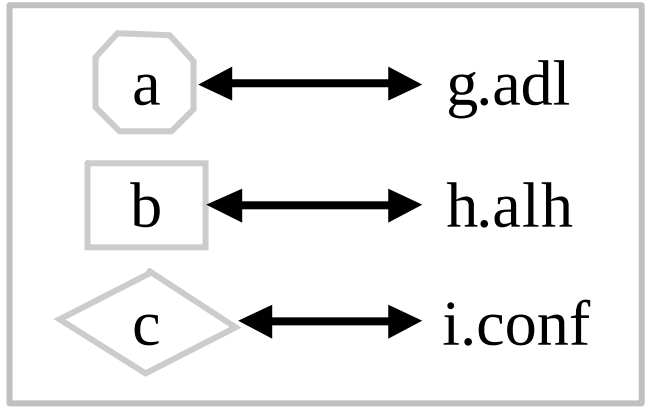
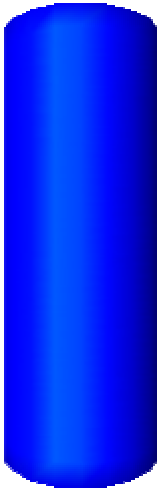


Server

EPICS IOCs

service



„EPICS“ Design

Config. Files

Database

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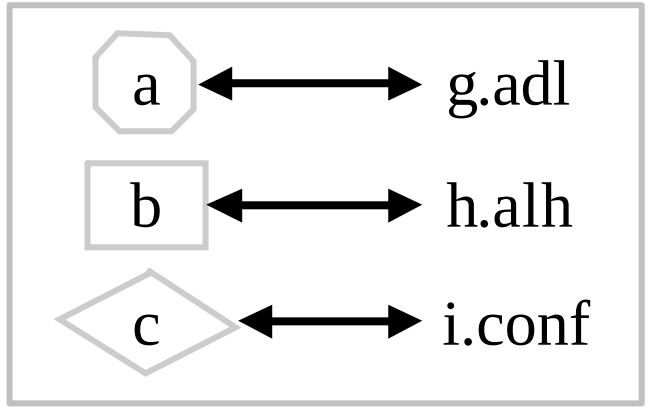

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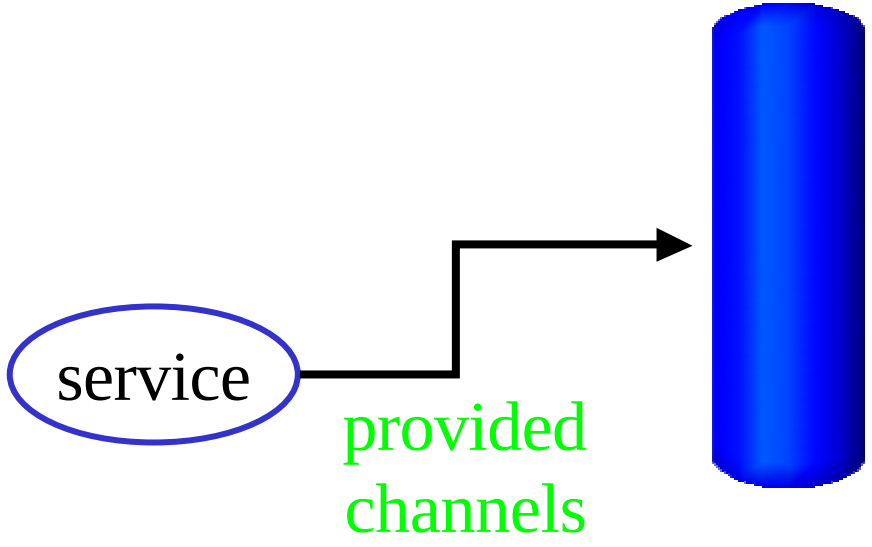

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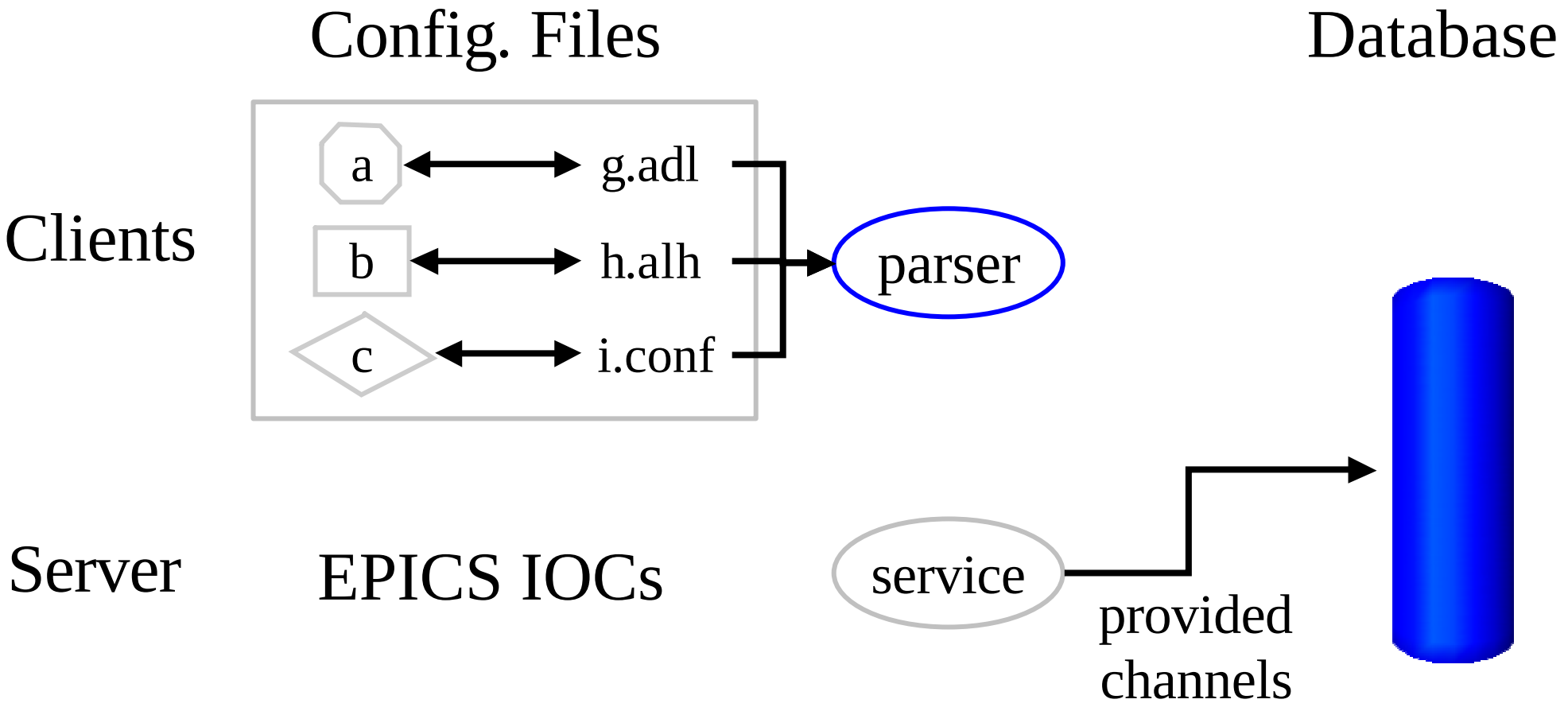

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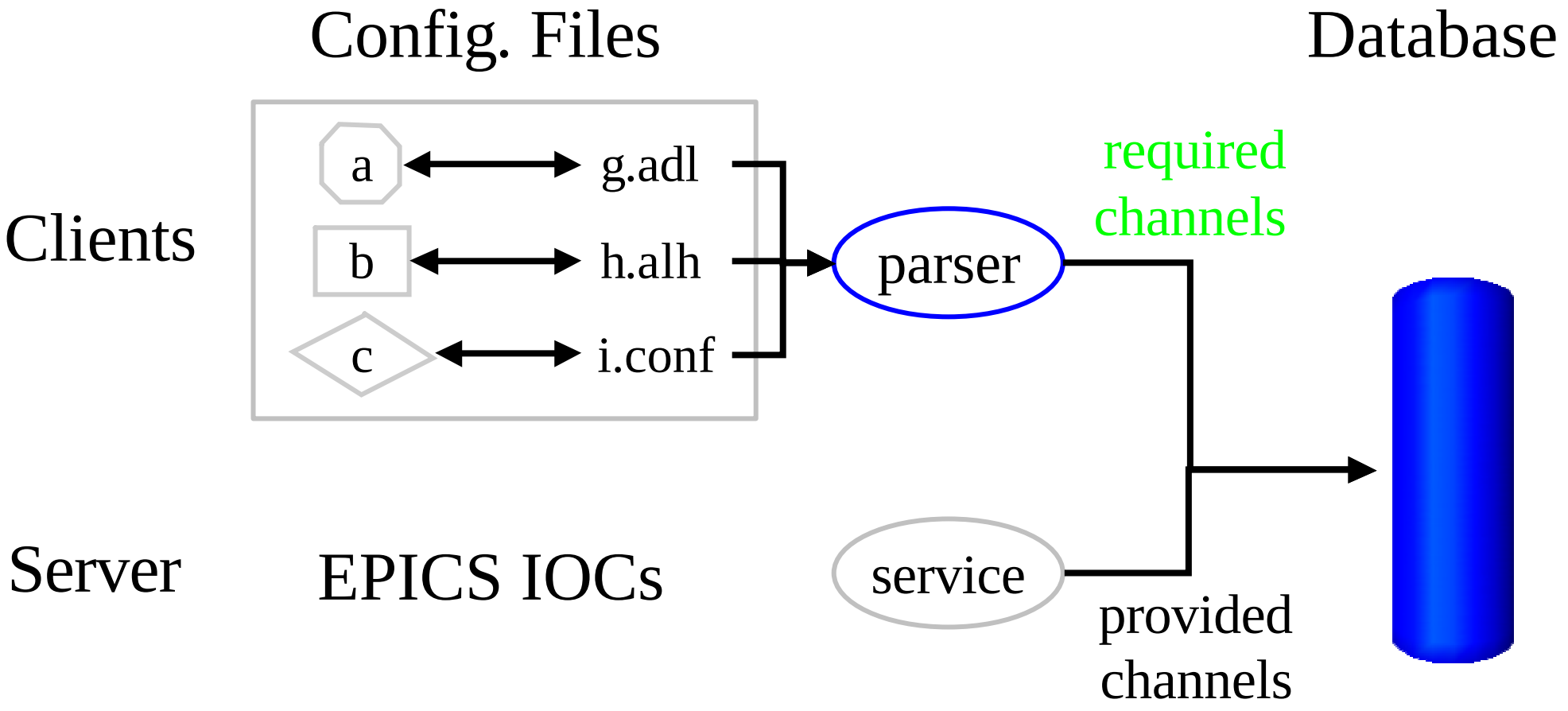


Design Summary

- **Service** to upload record names and record types at boot time from each EPICS IOC to the oracle database. Also upload defined fields for each record type.
- **Parser** to extract required channels from all „used“ configuration files for O(10) types of applications
- **Tables** in the oracle database
- **Queries** for the oracle database

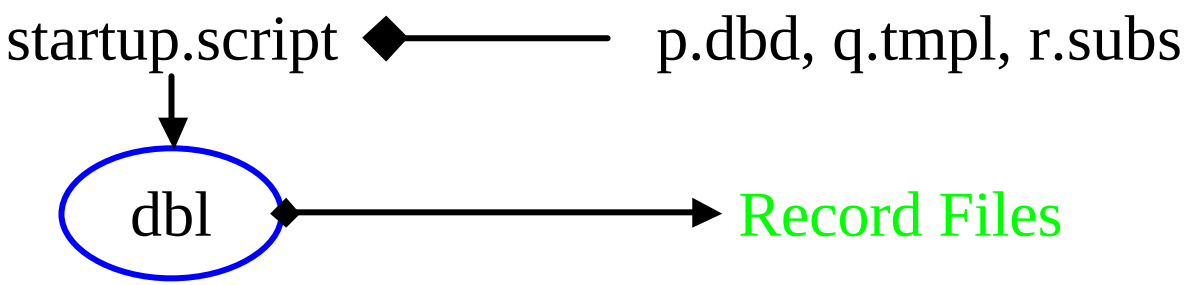
Service Implementation

EPICS IOC | Boot PC | Database

startup.script ◆——— p.dbd, q.tmpl, r.subs

Service Implementation

EPICS IOC | Boot PC | Database



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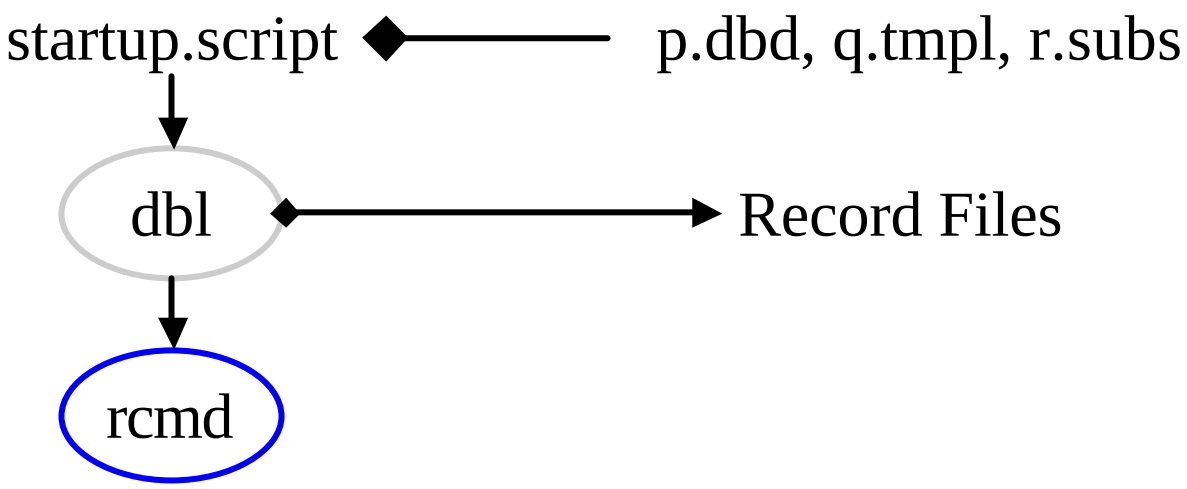

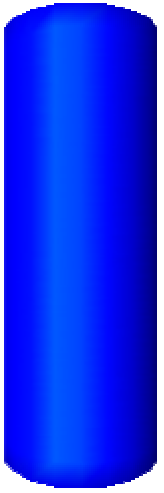

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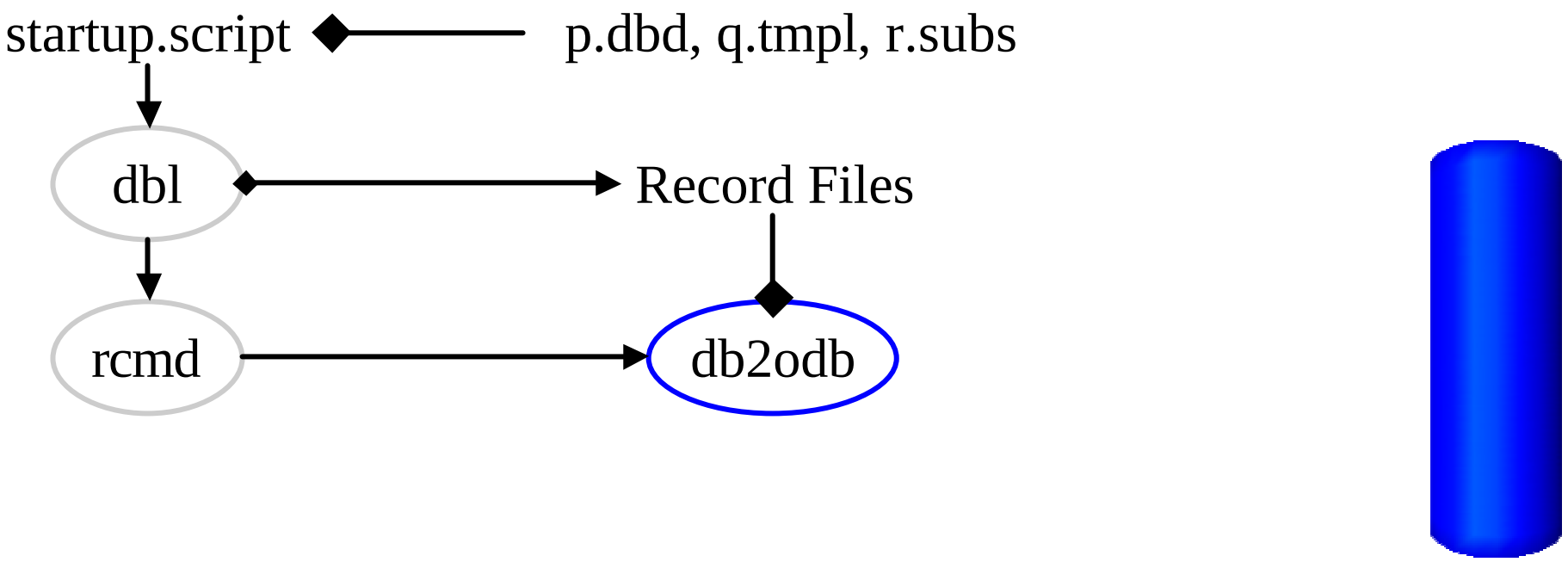

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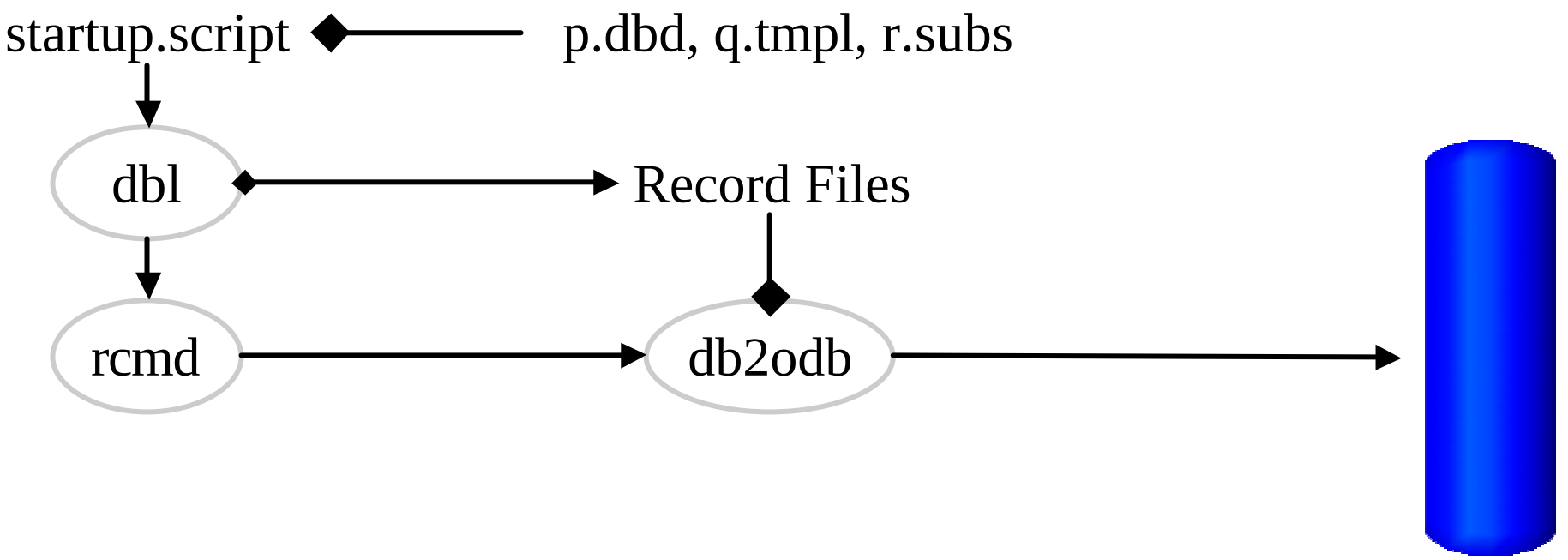

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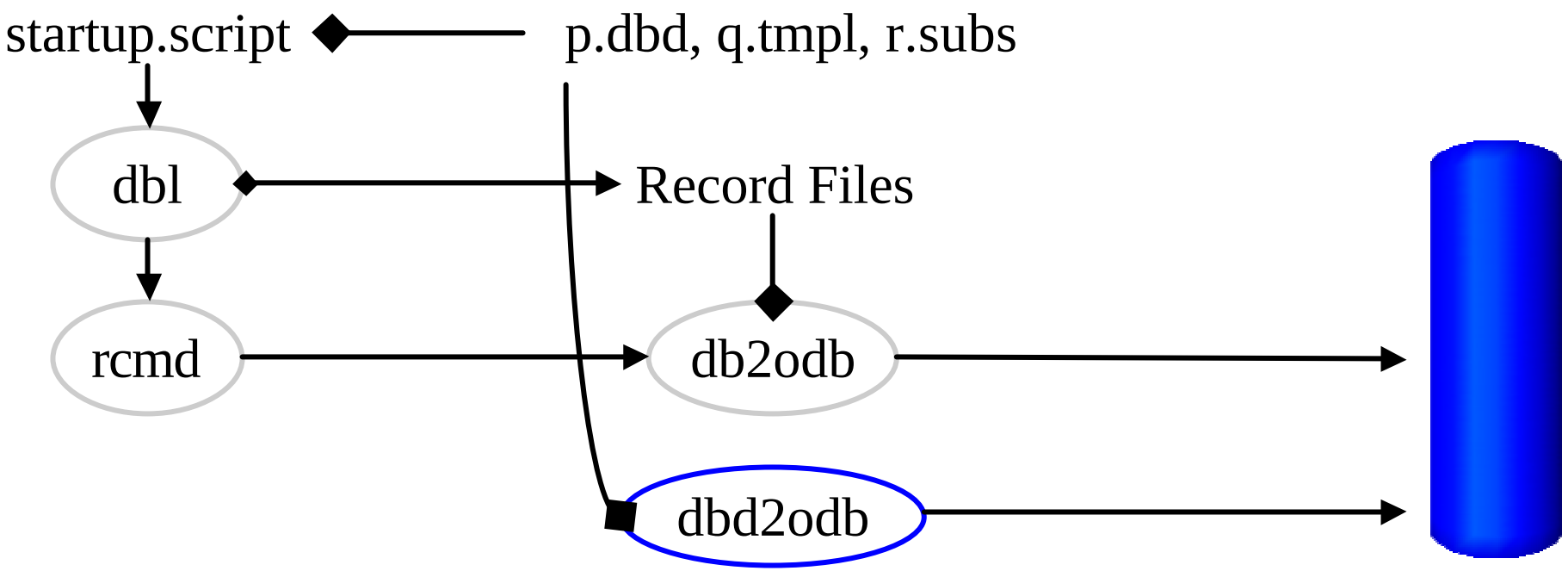
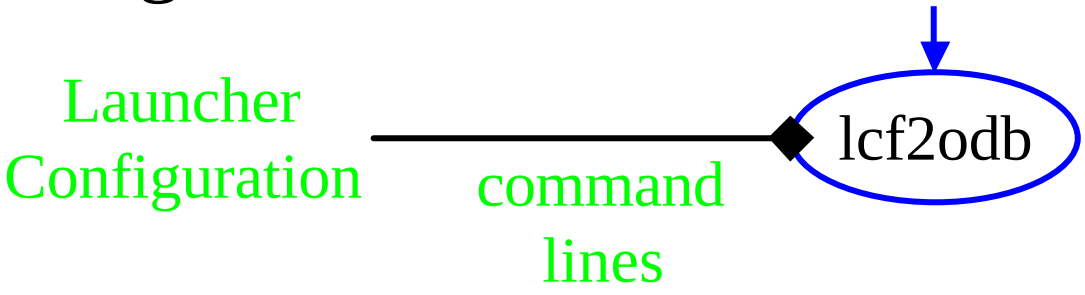


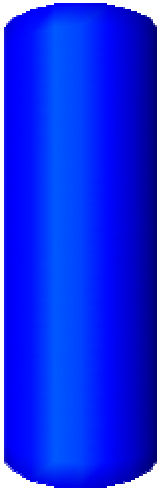
Parser Implementation

Config. Files

Parser

Database





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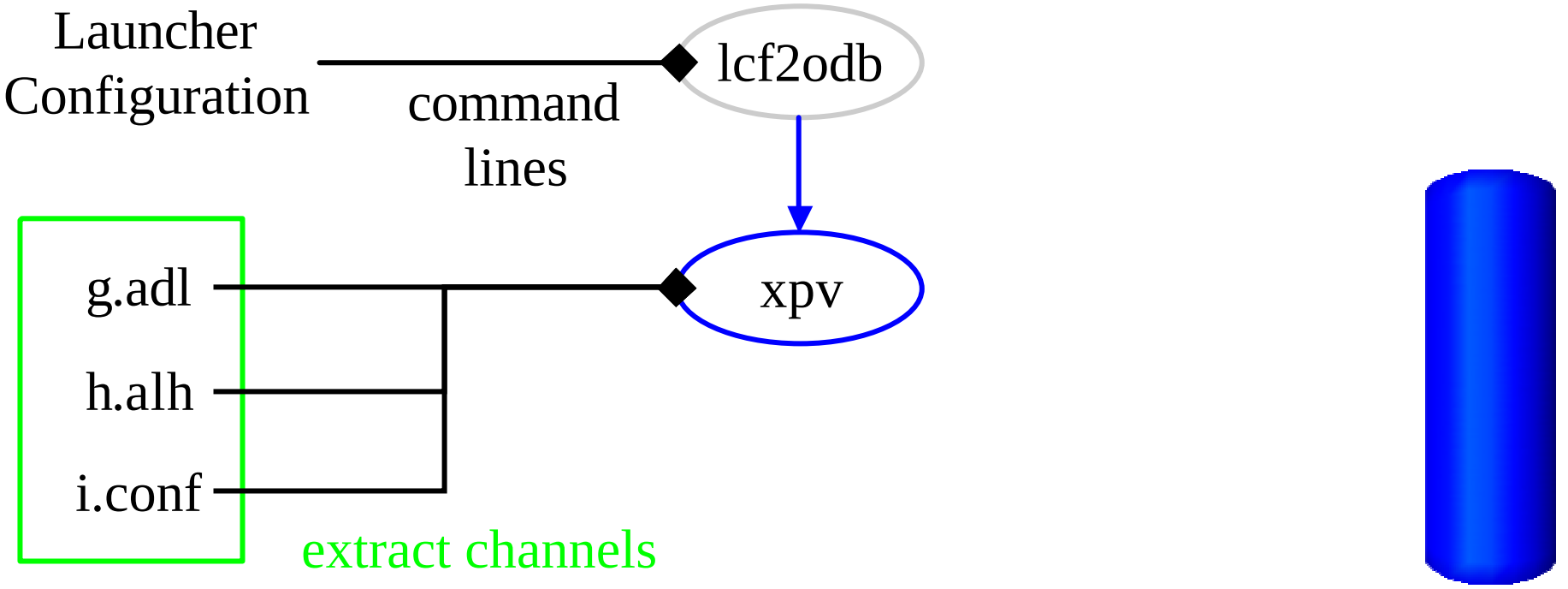

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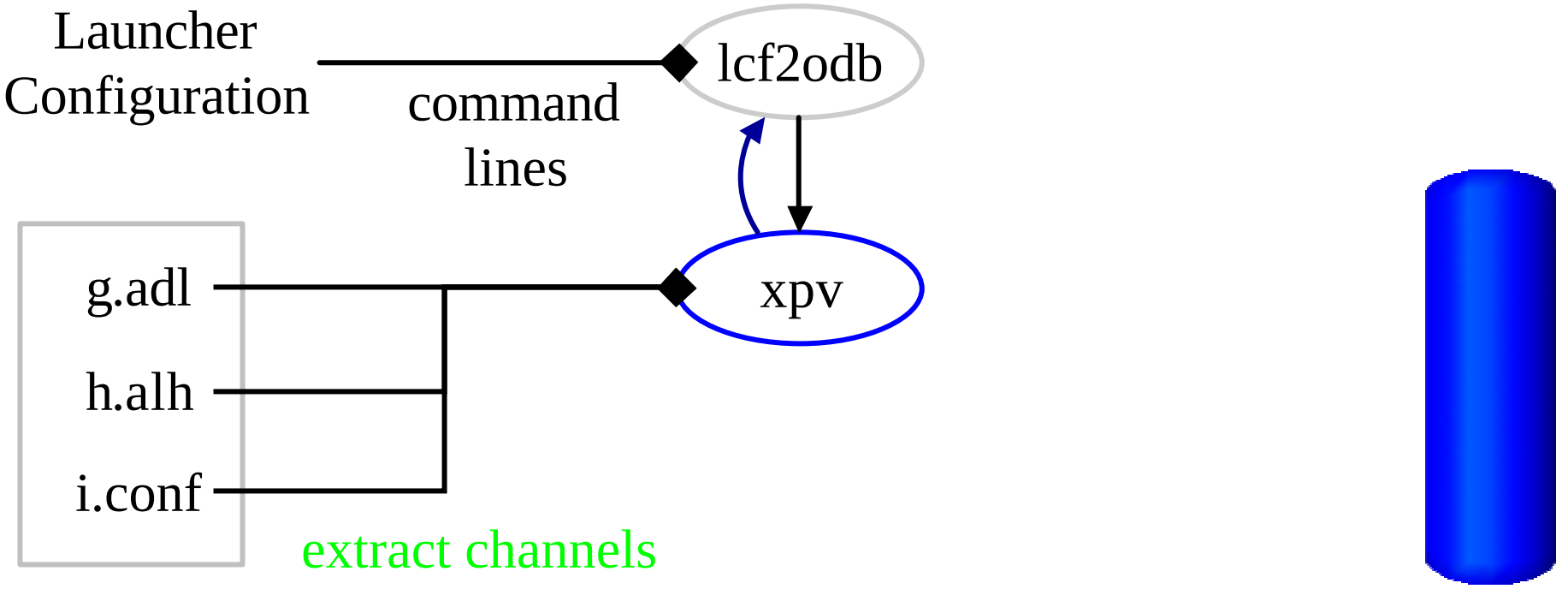

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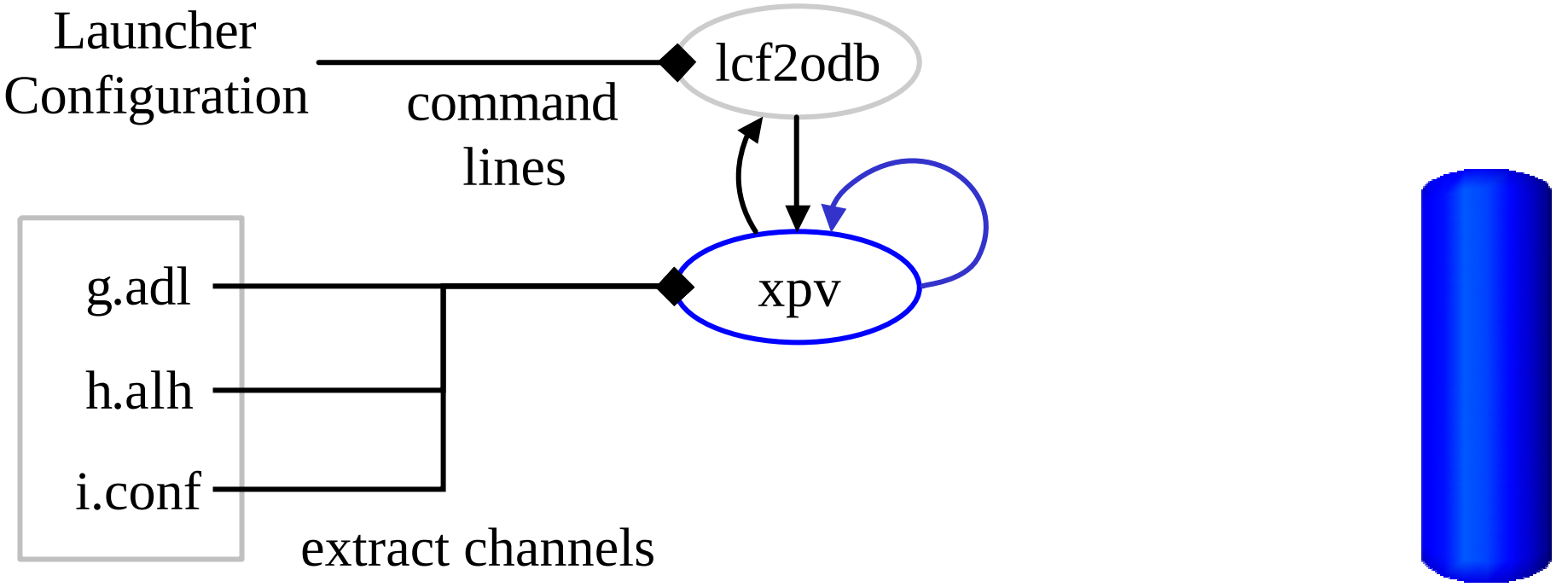

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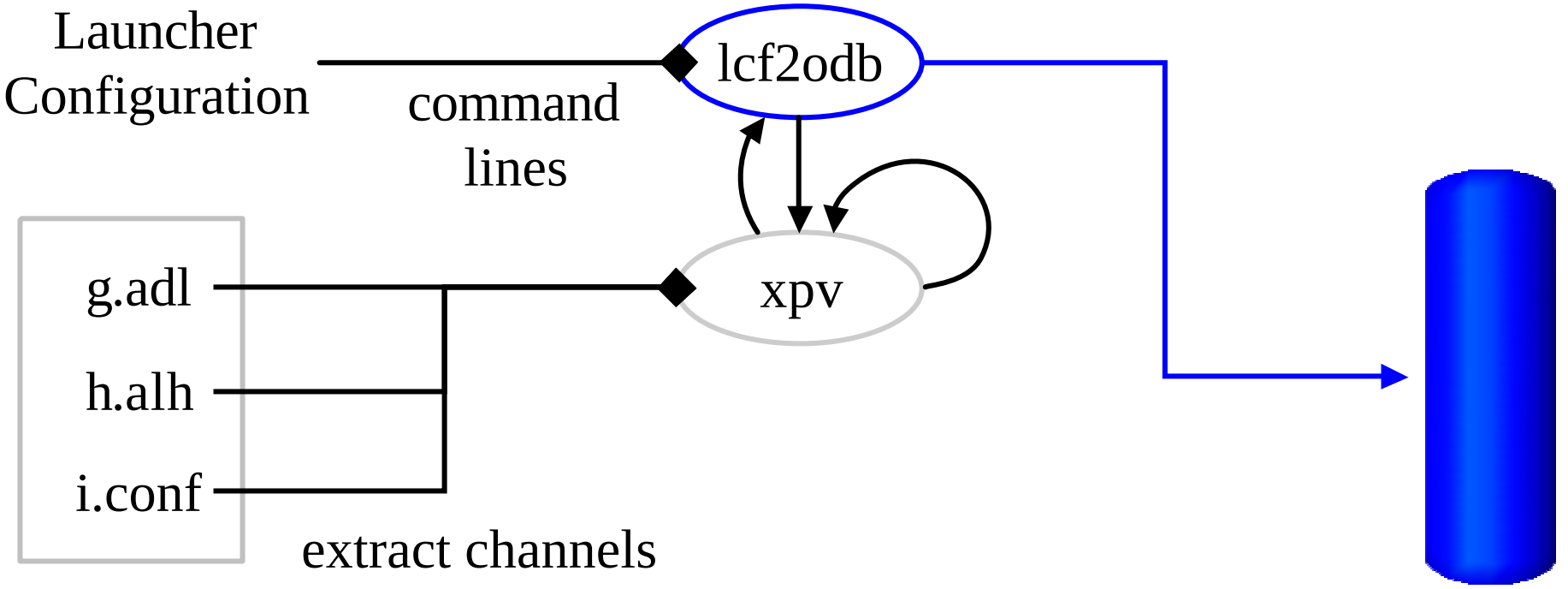

Tables

Just four database tables

Application Config Channels

- Filename
- Macrovar
- Device
- Property
- Field

Application Config Files

- Filename
- Config File
- Load Time
- Load Date

IOC Channels

- Device
- Property
- Record Type
- Load Time
- Load Date
- Deleted Time
- Deleted Date

Record Type Definition

- Record Type
- Field
- Field Type

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Performance

- Server
  - Tested on 2 simulation IOCs, each 16'000 records.
  - No boot-delay, dumped to files in 20 sec.
  - Upload from boot PC in less then 2 minutes.
- Parser
  - Tested on all 592 used configuration files.
  - Access of 20660 different channels in total.
  - Complete parsing needs 4 minutes, incl. upload.

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Usage: Sample Query

- Detect all files with missing channels

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SELECT filename, macrovar, device, property, field
FROM Application_Config_Channels acc
WHERE not exists (
        SELECT * FROM IOC_Channels ioc
        WHERE acc.device = ioc.device and
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Usage

- Query which IOCs should provide a channel
- Search for discontinued channels
- Server programmer can search for applications, using his channels
- Check of naming conventions
- Check consistency of configuration files
  - detects non-existing related panels
  - detects faults in macro substitution
- Get statistics for a control system overview

Outlook

- Will be implemented for all SLS IOCs
- Configuration file check required for production release
  - ensures that the database is up-to-date
  - enables early detection of configuration errors
- Offline checks after each shutdown
  - reduces accelerator startup time
  - increases reliability of the control system
- Upload information about server links