# Technical CCD Software Description - 1

## •Domain of application:

Autoguiding / Field Stabilization on Telescopes

☞ `VLT AG/FS, NTT Autoguider`

Active Optics on UTs (Schack-Hartmann pattern)

☞ `VLT AO, NTT IA`

Slit Viewing on Instrument applications

☞ `NTT EMMI Slit Viewer`

☞ `VLT Test Camera, UVES etc...`

## •Characteristics:

- transputer-based CCD controller
- high speed acquisition and processing,
  - ☞ `VLT FS up to 30Hz`
- could be extended to other CCD controllers
- DCS base interface (CDT, DB)

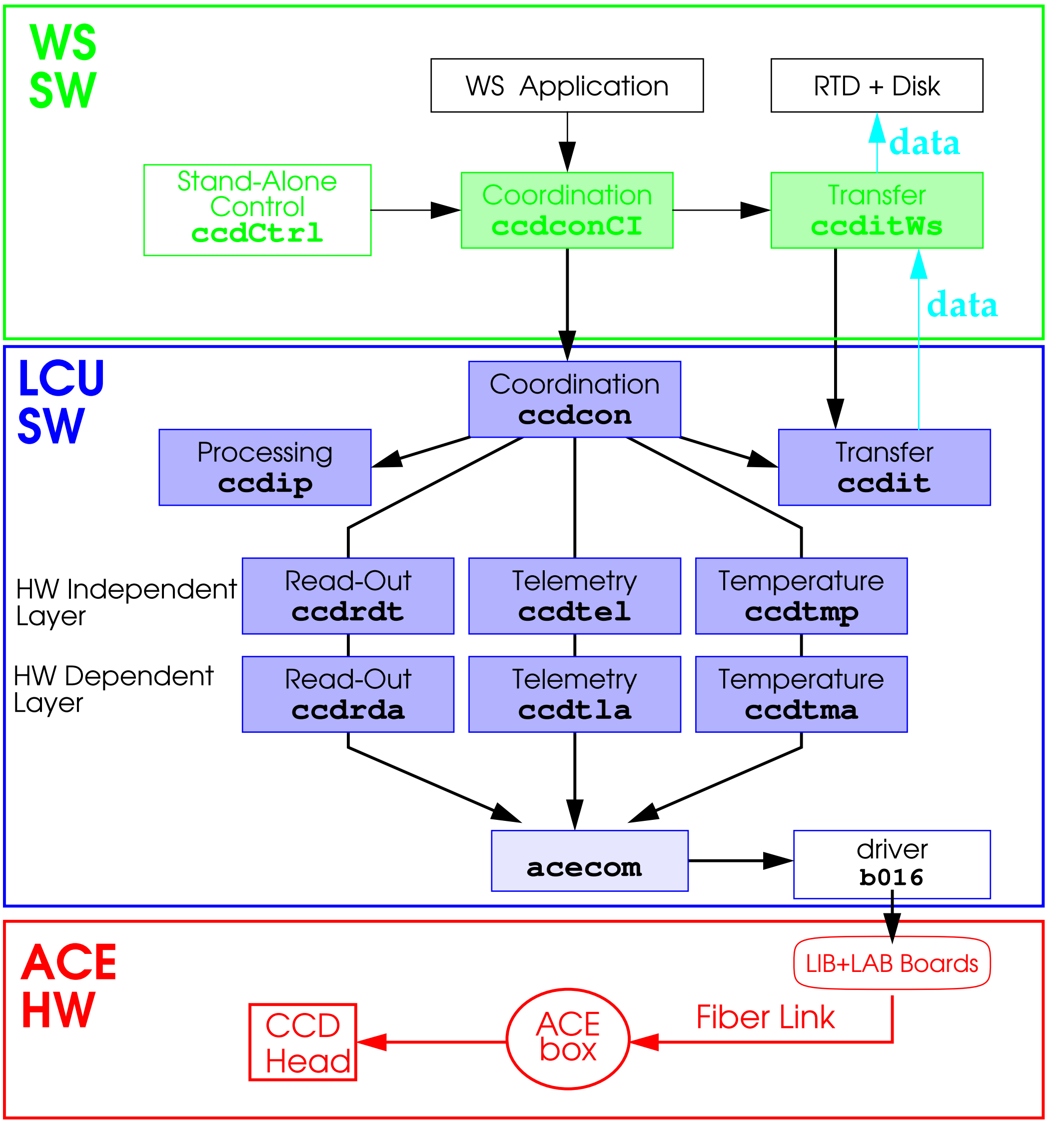
# Technical CCD Software Description - 2

- Features:
  - CCD Array:
    - Small 400×290 pixels (22µm)
    - Large 580×400 pixels (22µm)
  - Readout:
    - Full Frame approx. 0.5 MB/s
    - Windowed 1 or 2 disconnected
    - Exposure Time > 3ms (<10% accuracy)
  - Image Processing:
    - Statistics Extrema, SNR, background
    - Centroid Centroid, FWHM, thresholding
    - Image Quality
    - External function hook for synchronization
  - Image Transfer & Display:
    - Transfer to WS A-/Synchronous
    - Display configurable 1 out of N via RTD
    - Storage idem above in FITS format
- Platforms:

WS : Coordination on CCS
LCU : Real-Time Core on LCC
ACE: Detector control (Transputers + DSP)

# Architecture

## Control Flow



# Working with a TCCD

## •instanciation

```
Edit file $VLTDATA/ENVIRONMENTS/<env>/dbl/DATABASE.db

    #define CCDNAME ccdagc
    #define CCDROOT :ccdagc
    #include “ccd.db”
    #undef CCDNAME
    #undef CCDROOT

Make databases of both WS and LCU environments
```

## •preparation

```
Create INS_ROOT directory structure
Restart RTAP environment
Reboot LCU
```

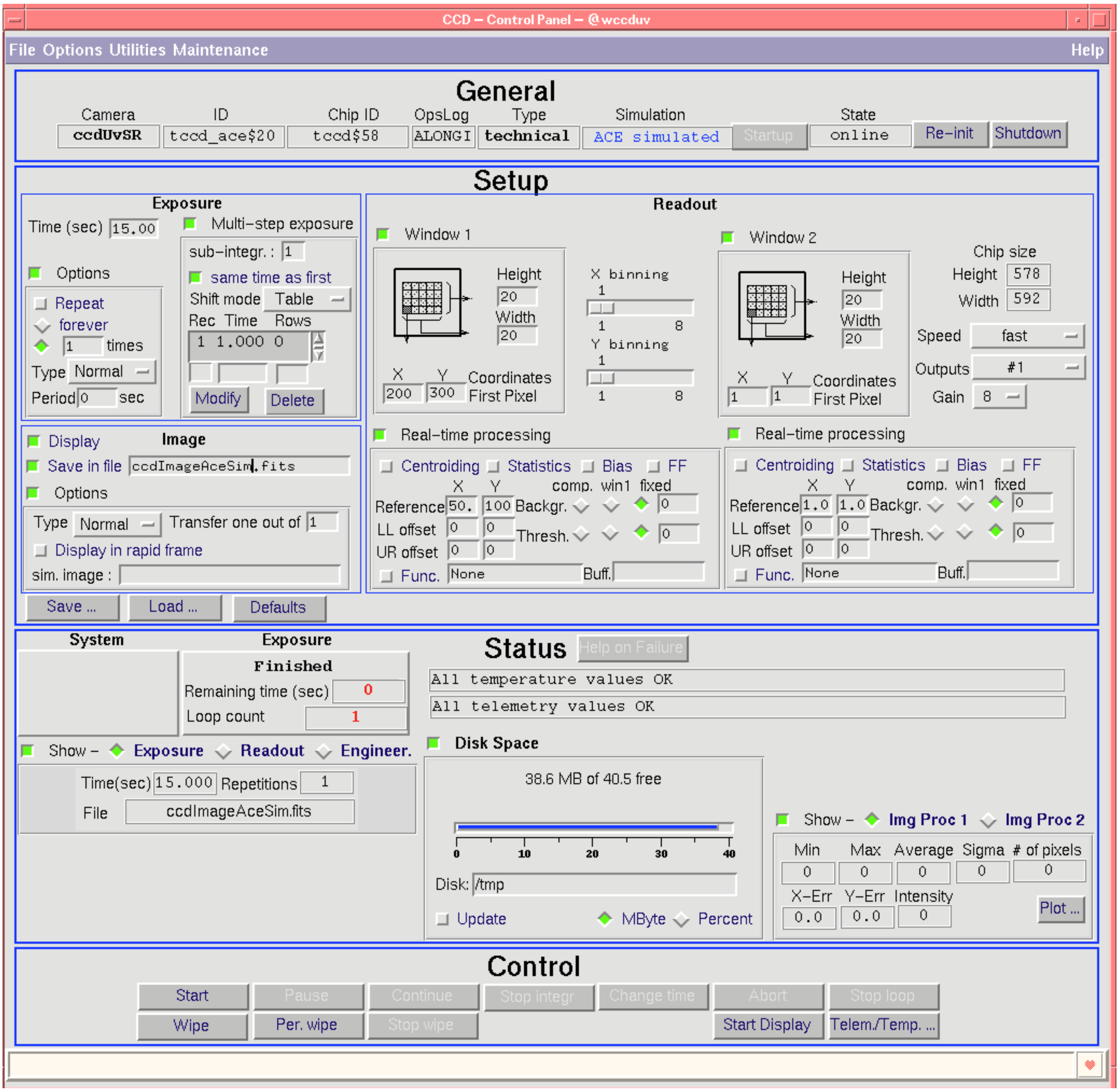
## •installation

```
prmd@te30:~ [1]-> setenv RTAPENV wa0tcs
prmd@te30:~ [2]-> setenv CCDNAME ccdagc
prmd@te30:~ [3]-> setenv CCDLENV la0agc
prmd@te30:~ [4]-> setenv INS_ROOT/insroot
prmd@te30:~ [5]-> ccdInstall.sh ccdTec140.dbcfg
prmd@te30:~ [6]-> ccdDcsSetLogMask.sh ccdagc wa0tcs AGC1
prmd@te30:~ [7]-> ccdDcsScan.sh ; ccdosScan.sh
```

## •operation

```
prmd@te30:~ [8]-> ccdStart.sh
```

# Operating in Stand-Alone



# Operating from an Application

## •Startup/Shutdown

- `ccdDcsStart.sh / ccdDcsStop.sh`
- `INIT / STANDBY / ONLINE / OFF / EXIT`

## •Setup

- ```
  SETUP  [-expId -1|0]
         [-file <filename>]
         [-function <fct par>[,<fct par>]*]
  ```

## •Exposures

- `START, STARTLP, STARTAG`
- `STOP, END, ABORT`
- `[STP]WAIT [[0|expId][,Global|Single]]`

## •Dictionary ESO-VLT-DIC.CCDDCS

- `FITS setup keywords`
- `FITS ops-log and conf-log keywords`
- `FITS header keywords`
  ```