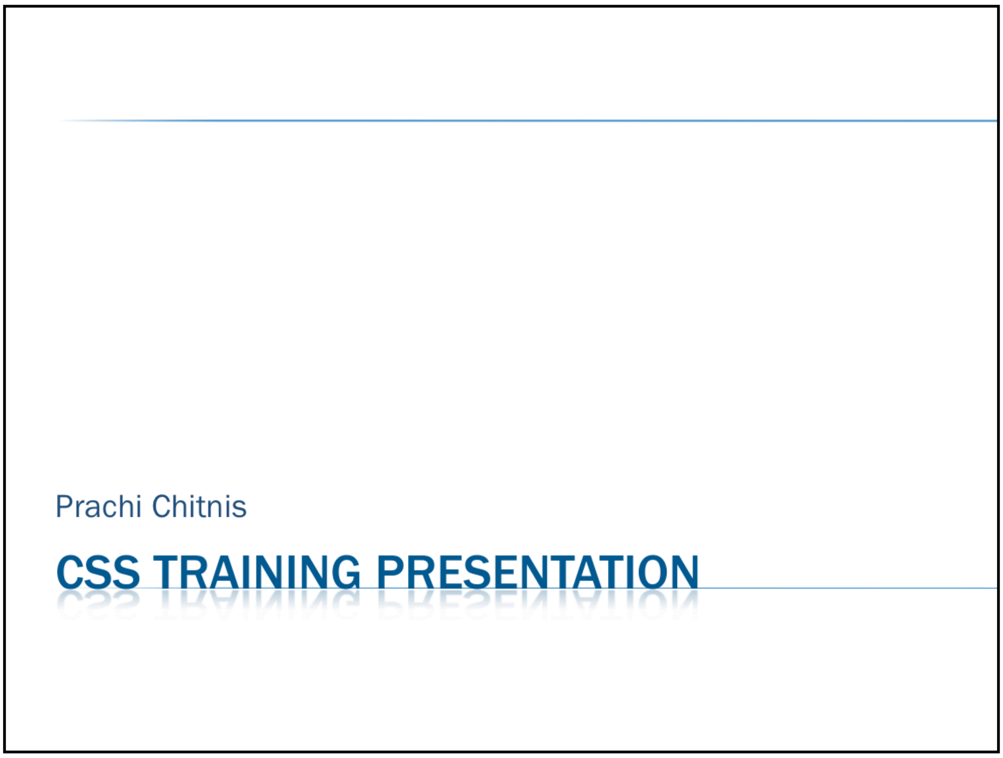
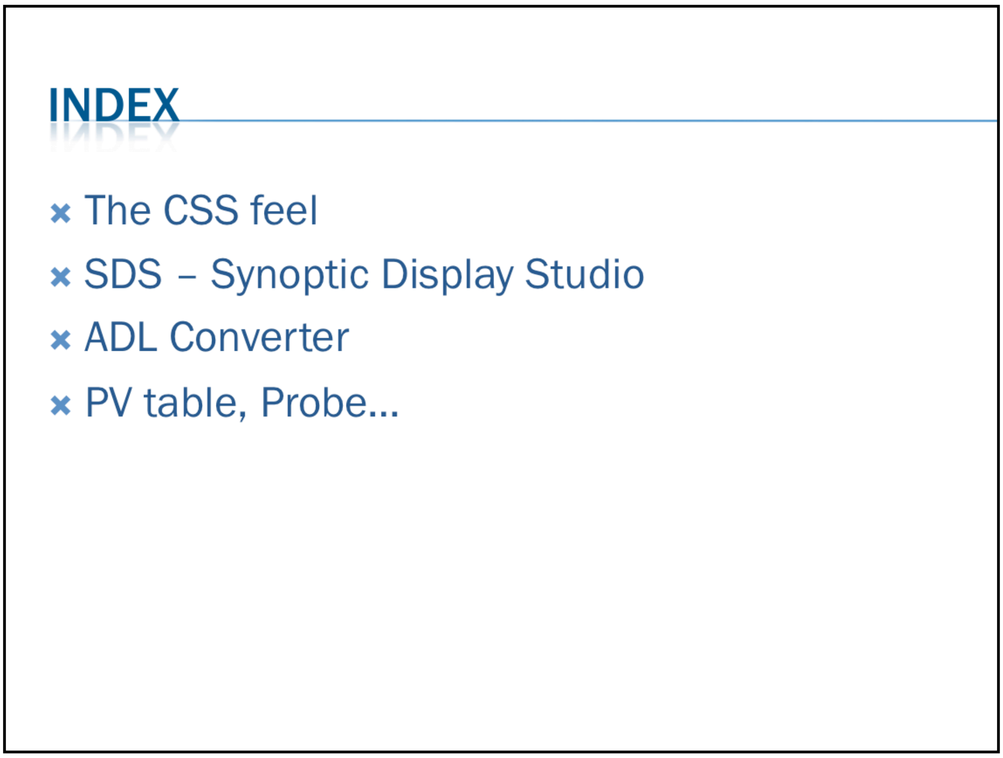


Prachi Chitnis

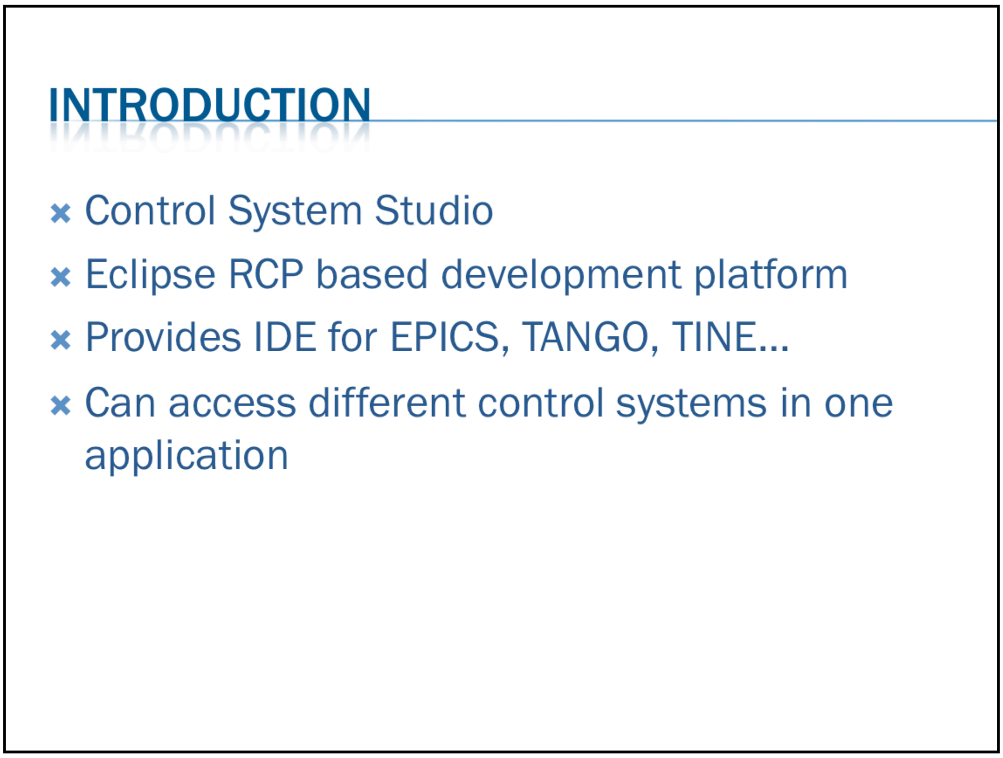
# CSS TRAINING PRESENTATION



## INDEX

- The CSS feel
- SDS – Synoptic Display Studio
- ADL Converter
- PV table, Probe…

# THE FEEL OF CSS

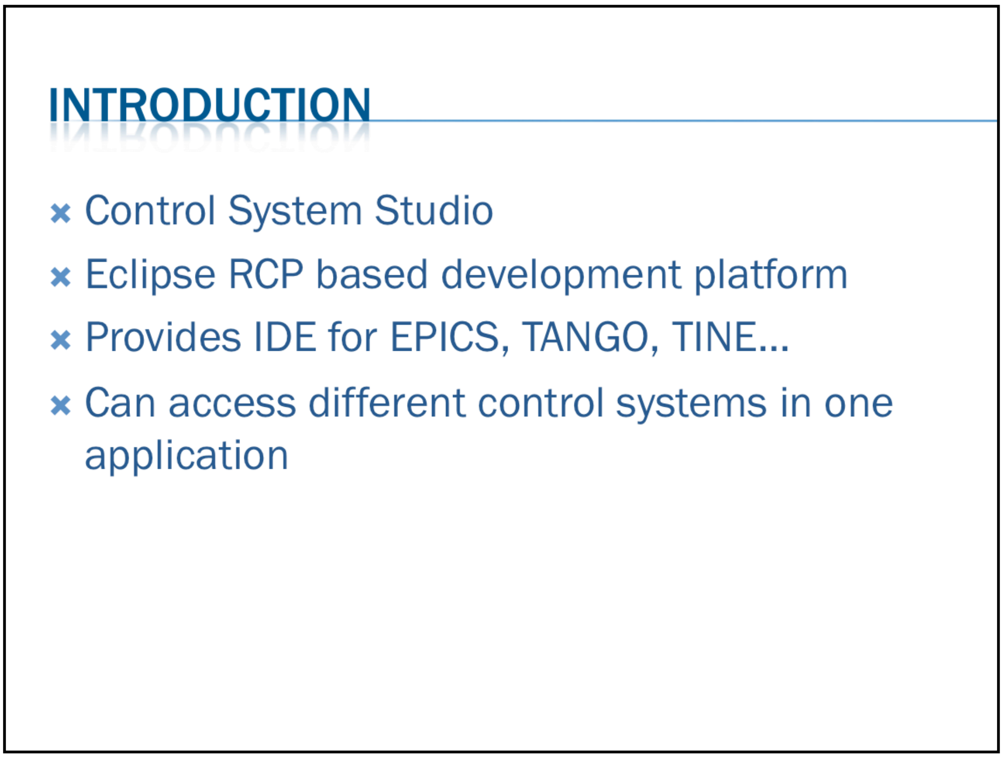


## INTRODUCTION

- Control System Studio
- Eclipse RCP based development platform
- Provides IDE for EPICS, TANGO, TINE…
- Can access different control systems in one application

The Control System Studio (CSS) is an Eclipse RCP based development platform and the fundament for many applications like EPICS, TANGO etc. As most of these applications deal with process variables and connections to control systems, the CSS Core provides the necessary APIs for a convenient start.
The integrated development environment of CSS provides facility for database development, alarm management system, display development and conversion, data trending, diagnostic tools etc.

**Process variable address syntax**
The general syntax of a process variable address is defined as follows. This uses the metasyntax based on the Extended Backus-Naur Form
[1] address ::= [protocol] id [type]
[2] protocol ::= ('dal-epics' | 'dal-tine' | 'dal-tango' | 'local') '://'
[3] id::= (letter | specialcharacter) +
[4] type ::= ', ' ('double' | 'int' | 'long' | 'string' | 'enum')
[5] letter::= 'A' | ... | 'Z' | 'a' | ... | 'z'
[6] specialcharacter::= ':' | '/' | '\' | '.' | '[' | ']'
[7] number ::= digitWithoutZero (digit)*
[8] digit ::= '0' | ... | '9'
[9] digitWithoutZero ::= '1' | ... | '9'
There are 3 optional and 1 mandatory fragments that constitute a full process variable address (line 1).
The protocol (line 2) is optional and defines the connection protocol. If a prefix is not specified, a default protocol is chosen according to the settings of the CSS-Core/Control-System preference page.
The id (line 3) is mandatory. It must be a globally unique name identifying the information you want to address.
The type (line 5) is optional, too. It can be used to specify the expected return type for channel values explicitly.



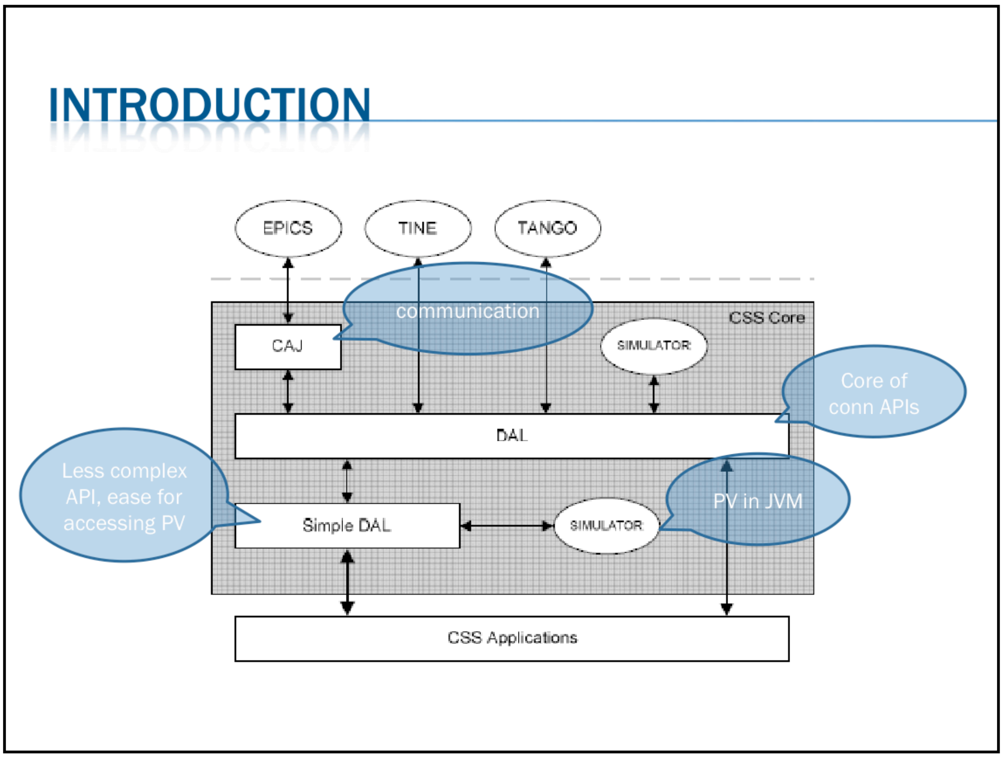
## INTRODUCTION

- Control System Studio
- Eclipse RCP based development platform
- Provides IDE for EPICS, TANGO, TINE…
- Can access different control systems in one application

**Syntax for EPICS**

When EPICS channels are addressed, line 3 is as follows:
[3a] id::= recordname ['.' fieldname] [characteristic]
[10] recordname ::= (letter | specialcharacter)+
[11] fieldname ::= (letter)+
[12] characteristic ::= '[' (letter)+ ']'
An EPICS process variable is always identified by its recordname (line 10) which is therefore mandatory.
Optionally a fieldname can be provided to address a single field of a record (line 11). If no fieldname is provided the address defaults to the .VAL field.
The characteristic (line 12) is optional as well. If defined it allows for accessing additional information of a record without establishing a new connection. All characteristics of the same record share the same connection. So in general it is a good idea to use characteristics whenever possible to save system resources. These can be

[Position] - position
[Description] – long description
[displayName] – short description
[propertyType] - type
[resolution] – number of bits used for ADC conversion of analog value when sampled
[minimum] – minimum allowed value
[maximum] – maximum allowed value
[graphMin] – minimum allowed value when displayed (e.g. in a chart)
[graphMax] – maximum allowed value when displayed (e.g. in a chart)
[format] – C print-f style format that is used to render the value
[units] – units of the value
[scaleType] – scale type for plotting (linear or logarithmic)
[warningMax] – upper warning limit
[warningMin] – lower warning limit
[alarmMax] – upper alarm limit
[alarmMin] – lower alarm limit
[sequenceLength] – sequence length
[enumValues] – enum value array (returns Object[])
[enumDescriptions] – enum value descriptions (returns String[])
[bitDescriptions] – bit descriptions (returns String[])
[conditionWhenSet] – active bit significance
[conditionWhenCleared] - inactive bit significance
[bitMask] – bits relevance

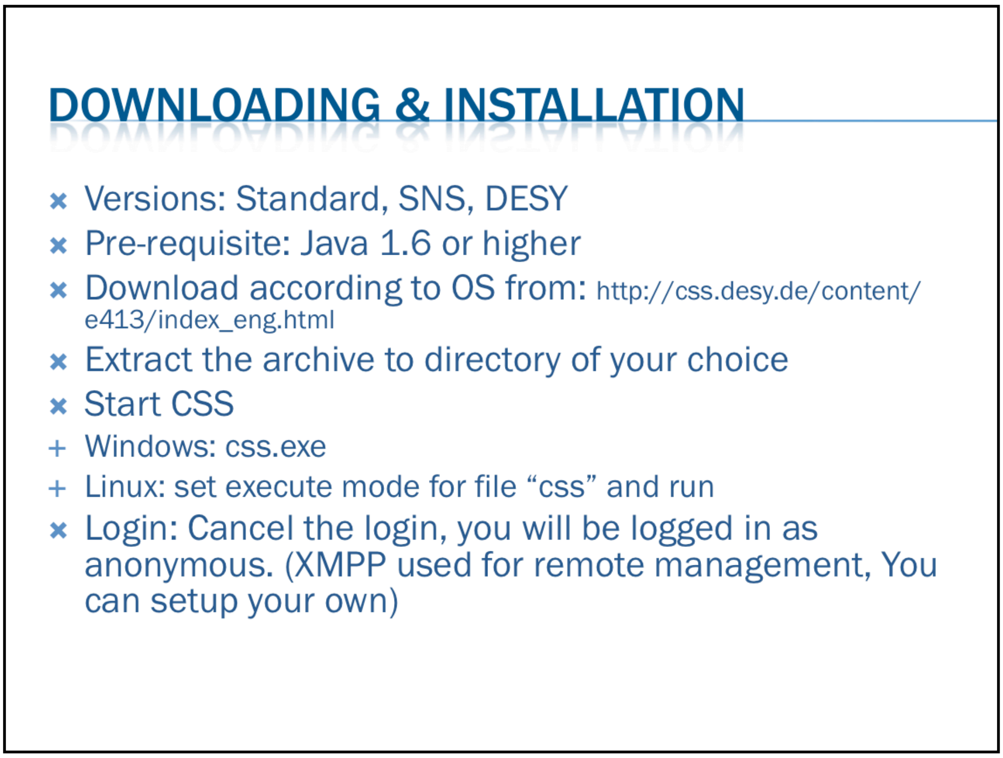


## INTRODUCTION

Simple DAL allows to use a certain syntax for accessing PVs.

The Data Access Layer (DAL) is the core of the connection APIs. It communicates to EPICS through CAJ (Channel Access Java), which is a pure Java implementation of the CA protocol. In the (near) future it will be possible to connect to TINE and TANGO control systems through DAL as well. A TINE integration is already available as Beta. DAL is an inherent part of the CSS Core but can also be used as a library in any other Java application. SimpleDAL is a connection layer built on top of DAL. It provides a slim, less complex API that allows for a much easier start for developers dealing with process variables in their applications. Using SimpleDAL implies a certain syntax for process variable addresses that enables applications to make use of the following features:

- access different control systems (e.g. TINE and EPICS) in one application
- use characteristics, a concept for resource saving access to record fields
- query process variables in different types
- use simulated channels
- address system functions as process variable



## DOWNLOADING & INSTALLATION

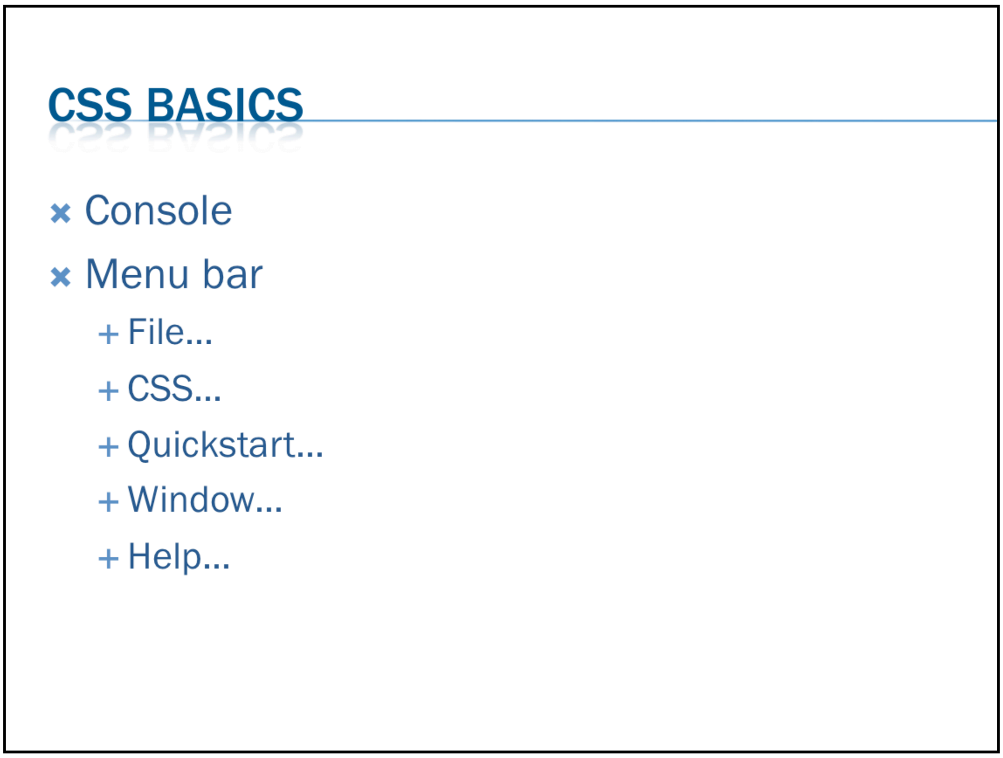
- Versions: Standard, SNS, DESY
- Pre-requisite: Java 1.6 or higher
- Download according to OS from: http://css.desy.de/content/e413/index_eng.html
- Extract the archive to directory of your choice
- Start CSS
  - Windows: css.exe
  - Linux: set execute mode for file “css” and run
- Login: Cancel the login, you will be logged in as anonymous. (XMPP used for remote management, You can setup your own)

It is recommended that the standard version of CSS should be downloaded for the first use. It consists of the CSS platform and common control system applications.

**Pre-requisites** - Java version 1.6 or higher is required
**Download** - The link to this is http://css.desy.de/content/e413/index_eng.html Please choose the version according to your operating system.
**Extracting** – extract the downloaded zip file in a directory of your choice.
**Starting**

Windows – Run the file css.exe under CSS <Top>.
Linux – Set executable mode for the file ‘css’ under CSS <top> and run

**Login** - The XMPP login can be cancelled for initial use. This logins you as anonymous user into the XMPP server specified in the preferences. The XMPP server is used for remote management. One can also set up his own XMPP server.



## CSS BASICS

- Console
- Menu bar
  - File…
  - CSS…
  - Quickstart…
  - Window…
  - Help…

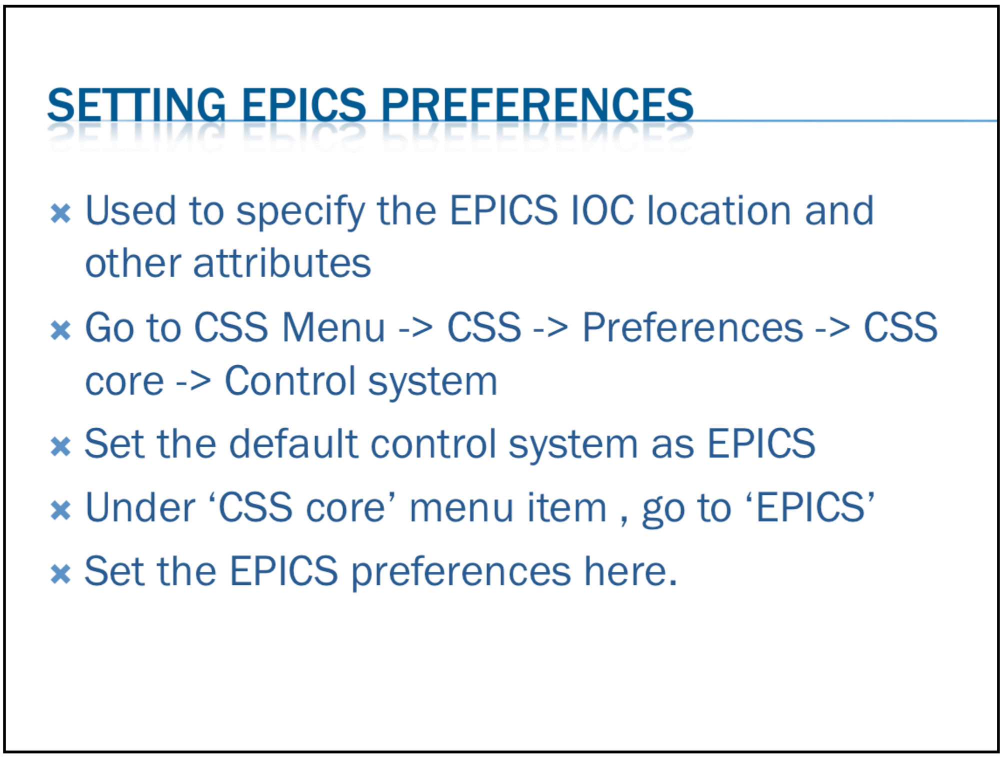
**CSS Console**
The CSS contains its own console. This console display system messages of certain events and information about occurred errors.

**File**
New - Create a new folder, resource,
Switch Workspace - Change the workspace of the CSS instance.
Export preferences - Write current preferences of the CSS instance in a file.
Open Workspace Navigator - Open the view 'Workspace'.
Import - Import resource from CVS in the workspace.
Exit - Shut down your CSS installation.

**Quickstart** - The Quickstart menu holds links to Synoptic Displays in the workspace. They can be added via context menu of a display.

**Window**
Open in New Window - Open a new CSS window.
Open Perspective - Select and open a particular CSS perspective. In the CSS context, a perspective is a set of user interface elements that are positioned in a certain way.
Show View - Open a particular CSS view. In the CSS context, a view is an element of the user interface that displays something and can be freely arranged by the user.

**Help**
Welcome
About CSS - Open the “About” dialog that contains the CSS license agreement.
Help Contents - Open the CSS help system. There you may find a more detailed description of the basic user interface concepts and all system settings.
Key Assist - Open an overview of all shortcuts.
Cheat Sheets - Shows available Cheat Sheets. Cheat Sheets are step by step documentations.
Software Updates - Manage the local CSS installation by installing and updating features. -> find and install -> search for new features to install



## SETTING EPICS PREFERENCES

- Used to specify the EPICS IOC location and other attributes
- Go to CSS Menu -> CSS -> Preferences -> CSS core -> Control system
- Set the default control system as EPICS
- Under ‘CSS core’ menu item , go to ‘EPICS’
- Set the EPICS preferences here.

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- Go to CSS Menu -> CSS -> Preferences -> CSS core -> Control system
- Set the default control system as EPICS
- Under ‘CSS core’ menu item , go to ‘EPICS’
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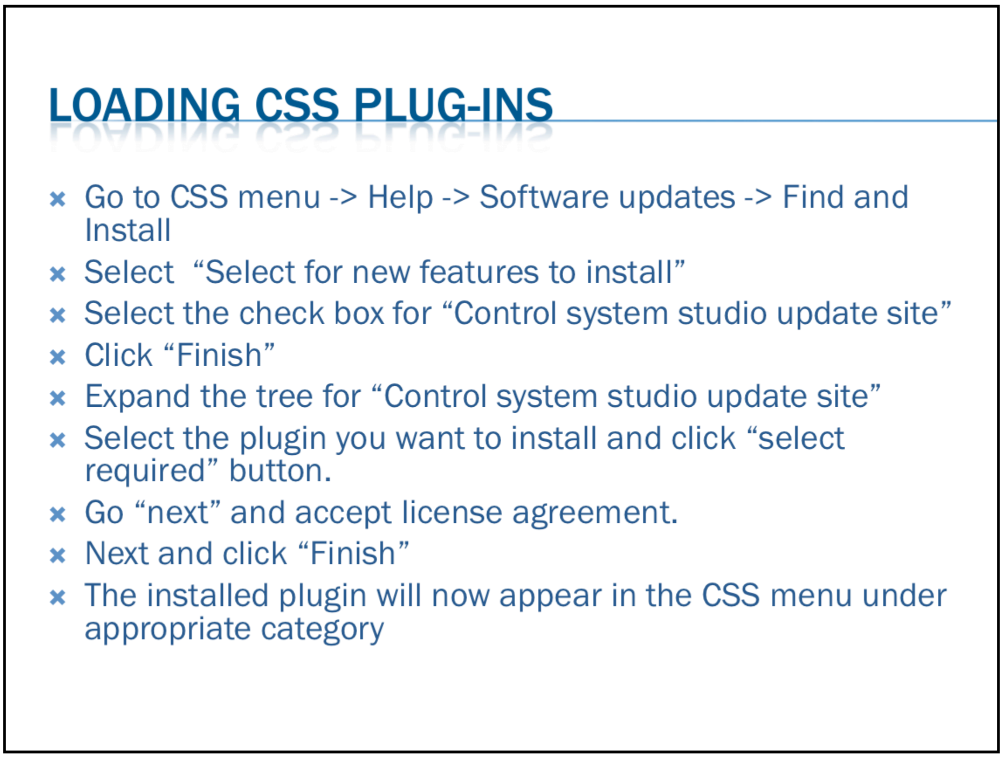
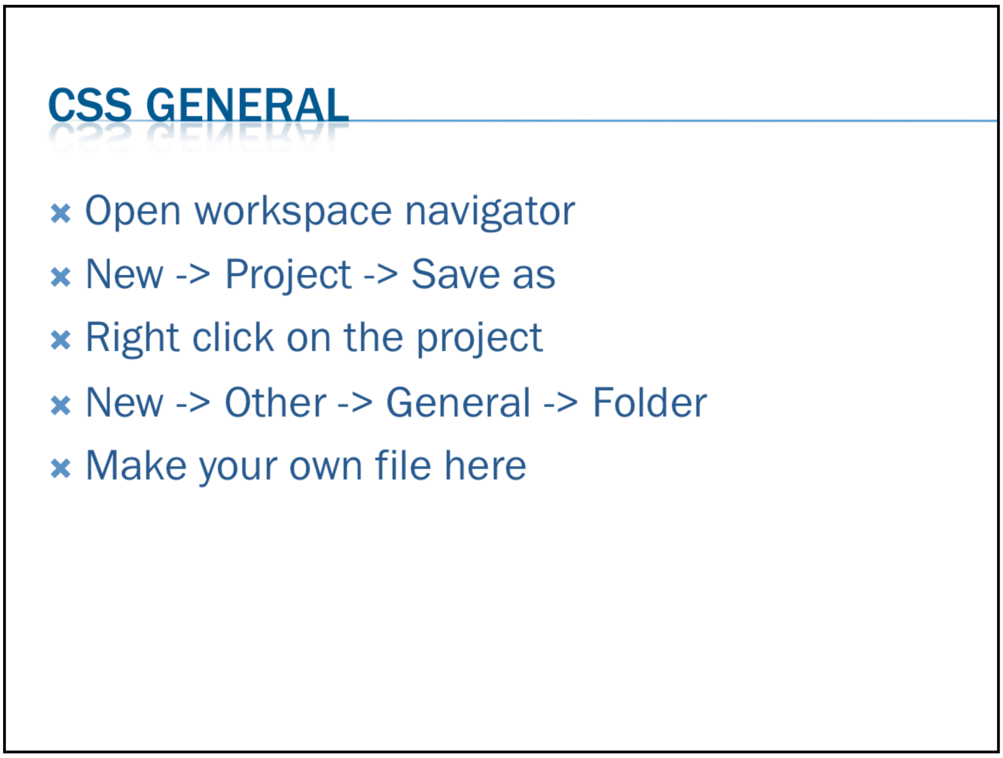


## LOADING CSS PLUG-INS

- Go to CSS menu -> Help -> Software updates -> Find and Install
- Select  “Select for new features to install”
- Select the check box for “Control system studio update site”
- Click “Finish”
- Expand the tree for “Control system studio update site”
- Select the plugin you want to install and click “select required” button.
- Go “next” and accept license agreement.
- Next and click “Finish”
- The installed plugin will now appear in the CSS menu under appropriate category

CSS plugins are the various tools available with it. To add these into the CSS:

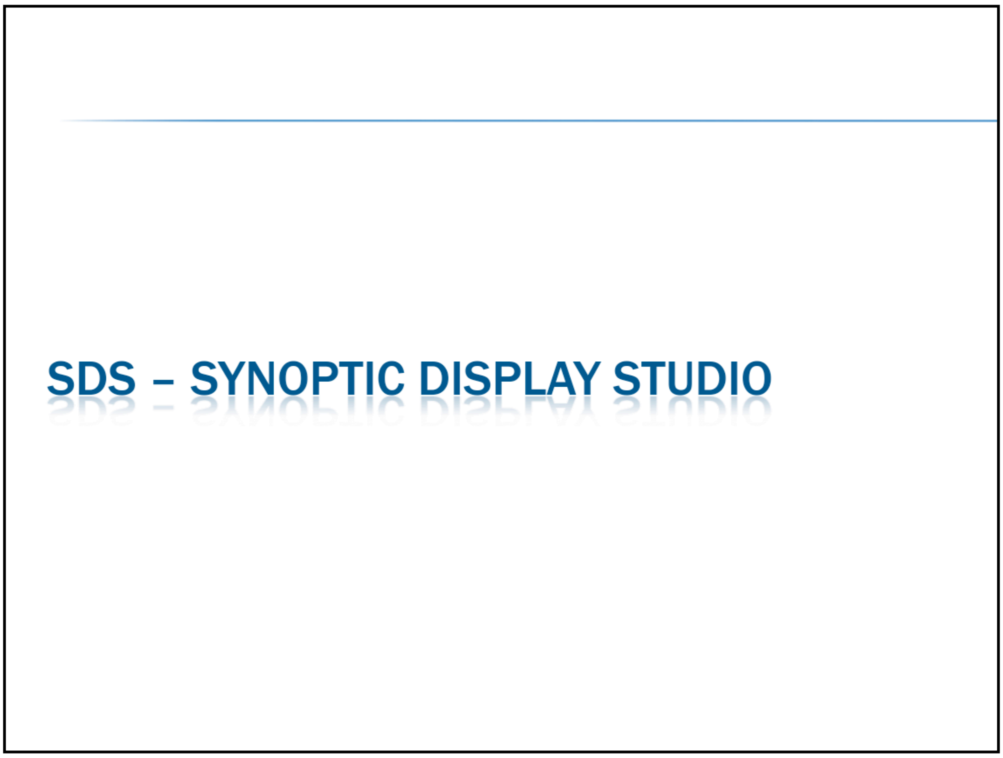
- Go to CSS menu -> Help -> Software updates -> Find and Install
- Select  “Select for new features to install”
- Select the check box for “Control system studio update site”
- Click “Finish”
- Expand the tree for “Control system studio update site”
- Select the plugin you want to install and click “select required” button.
- Go “next” and accept license agreement.
- Next and click “Finish”
- The installed plugin will now appear in the CSS menu under appropriate category



## CSS GENERAL

- Open workspace navigator
- New -> Project -> Save as
- Right click on the project
- New -> Other -> General -> Folder
- Make your own file here

To make a new project
- Go to File -> New -> other -> General -> Project
- Name the project
- You can make new folders or files inside a project
- To make a folder, right click the project in the navigator -> New -> other -> General -> folder
- To make a new file, right click the project in the navigator -> New -> other -> choose accordingly



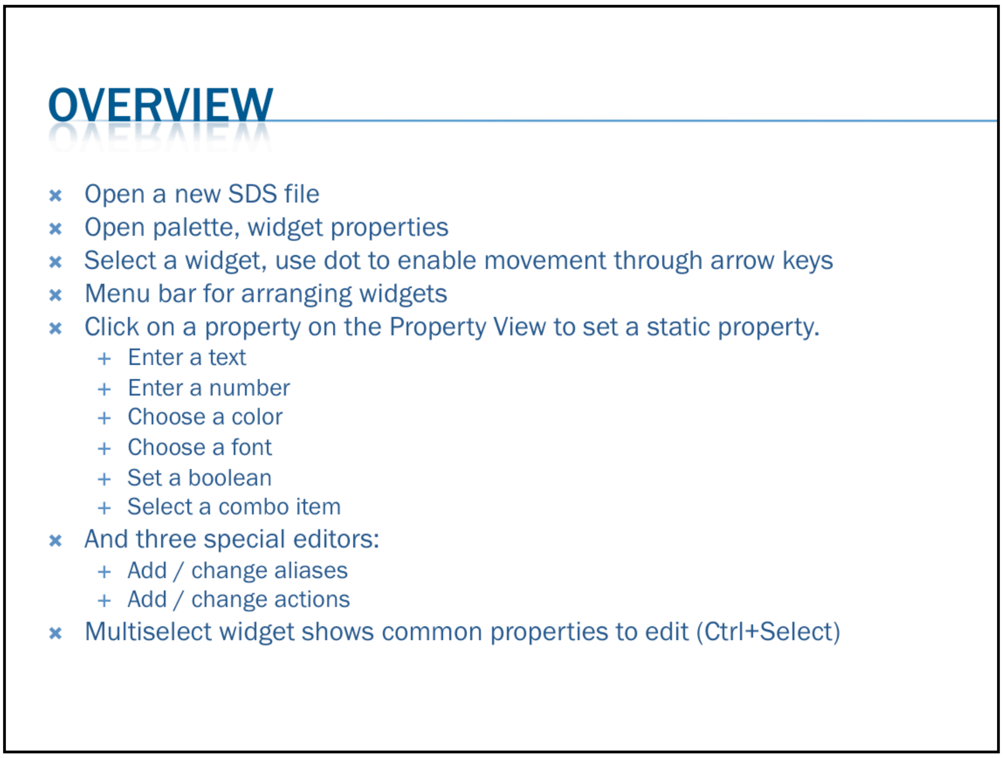
## SDS – SYNOPTIC DISPLAY STUDIO

**Synoptic Display Studio**
Synoptic Display Studio (SDS) is a graphical operator interface that represents the structure and current state of a plant. The structure is composed of basic elements so called widgets like labels, meters or bargraphs. To build up a part of a plant the widgets can be arranged in the edit mode of SDS on displays. In the execute or run mode the operators can control the processes via the displays.

**Navigator**
The navigator view shows the CSS projects in the workspace. A CSS project holds the configuration files for SDS displays and files of other CSS applications.

**Editor / Palette**
The Editor shows the displays in the edit mode and provides grid, align, ruler, etc. On the right side is the palette with all available widgets. There is a drag and drop support that connects a process variable from another CSS application automatically with a widget.

Widget Properties
For each selected widget in the editor the widget property view shows all available properties. It is possible to dynamise *LINK* each property. That means that a property is connected to a process variable and changes with the value of the variable.



## OVERVIEW

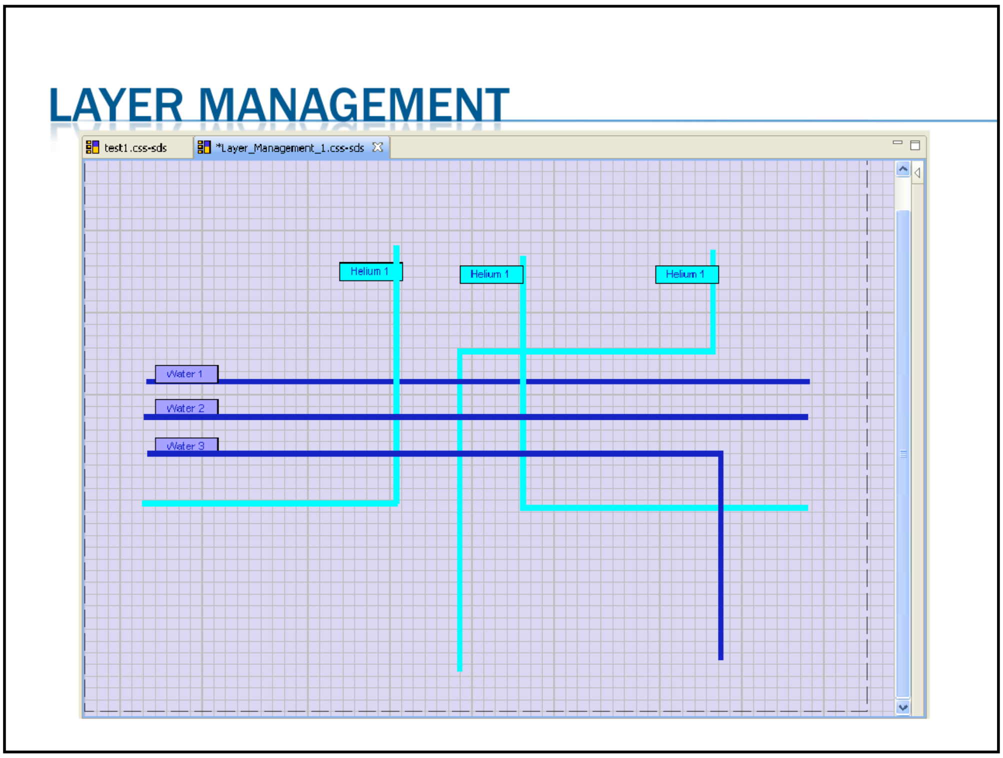
- Open a new SDS file
- Open palette, widget properties
- Select a widget, use dot to enable movement through arrow keys
- Menu bar for arranging widgets
- Click on a property on the Property View to set a static property.
  - Enter a text
  - Enter a number
  - Choose a color
  - Choose a font
  - Set a boolean
  - Select a combo item
- And three special editors:
  - Add / change aliases
  - Add / change actions
- Multiselect widget shows common properties to edit (Ctrl+Select)

There are two kinds of property
•Static- fixed during execution mode
•Dynamic – changes during execution mode

Single left click on a property on the Property View to set a static property.

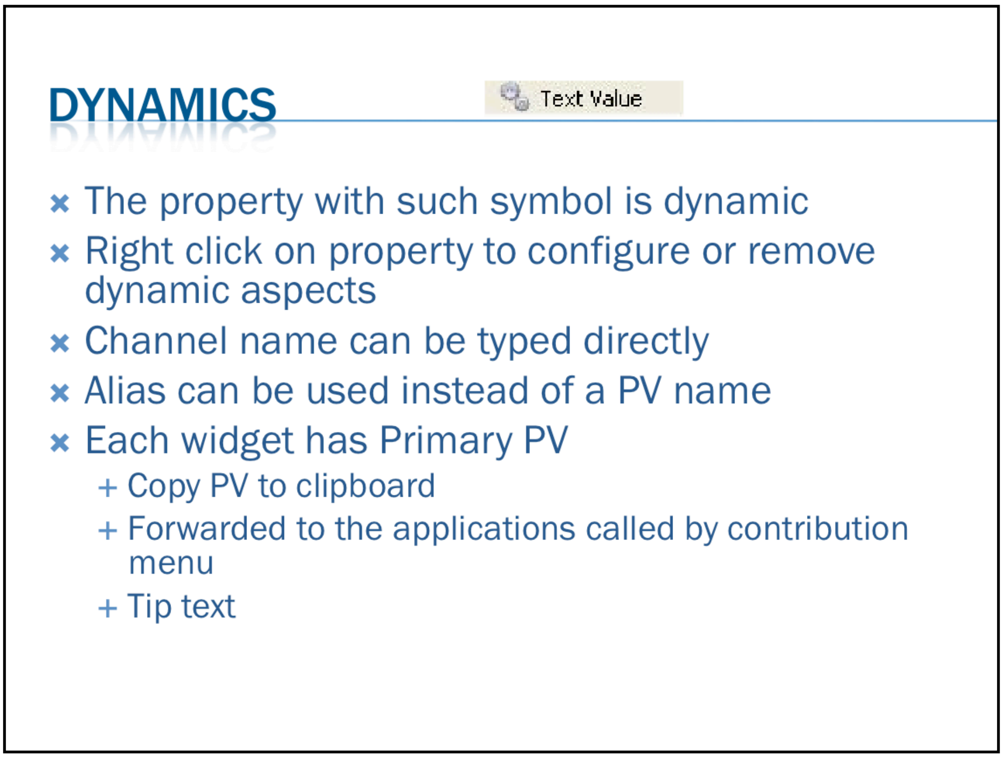
Single left click on a property opens an editor. There are six general editors:
-- Enter a text
-- Enter a number
-- Choose a color
-- Choose a font
-- Set a boolean
-- Select a combo item

And three special editors:
-- Add / change aliases
-- Add / change actions
-- Generate tooltip



# LAYER MANAGEMENT

- Open the Layer Management Menu:
  Window -> Show View -> Other… -> Synoptic Display Studio -> Layer Management
- Inside the layer management view, right click to add new layer, or move existing
- Visibility and order of a layer can be changed
- Visibility of a layer can be toggled dynamically
- Right click a widget to change its layer

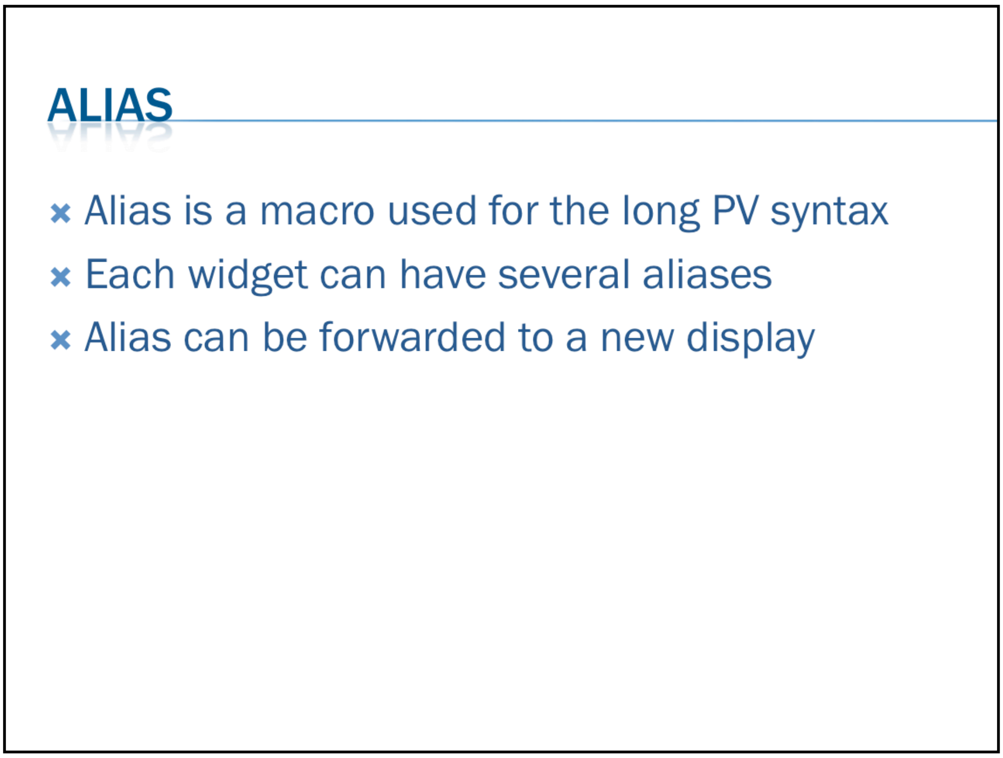


## DYNAMICS

- The property with such symbol is dynamic
- Right click on property to configure or remove dynamic aspects
- Channel name can be typed directly
- Alias can be used instead of a PV name
- Each widget has Primary PV
  - Copy PV to clipboard
  - Forwarded to the applications called by contribution menu
  - Tip text

- The property with ‘gear wheel’ symbol is dynamic
- Right click on property to configure or remove dynamic aspects
- Channel name can be typed directly
- Alias can be used instead of a PV name
- Dynamic properties can be configured by rules (explained later)
- Each widget has a Primary PV, it is used when you use
  - Copy PV to clipboard
  - Forwarded to the applications called by contribution menu
  - Tip text

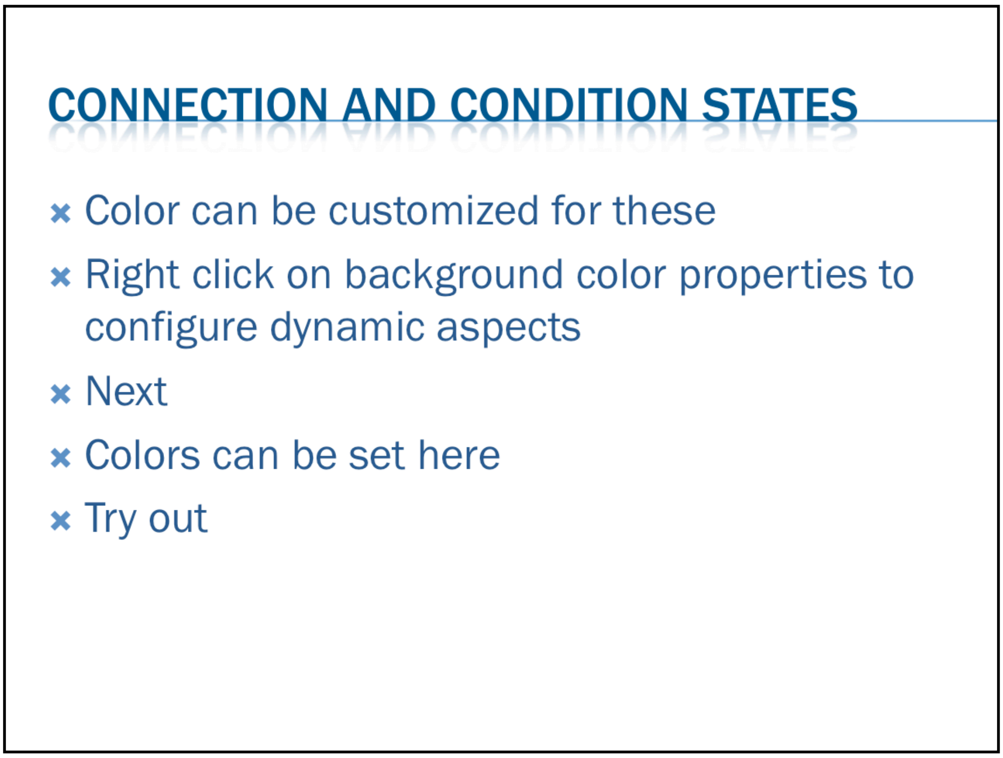
So it is necessary to define a primary PV



## ALIAS

- Alias is a macro used for the long PV syntax
- Each widget can have several aliases
- Alias can be forwarded to a new display

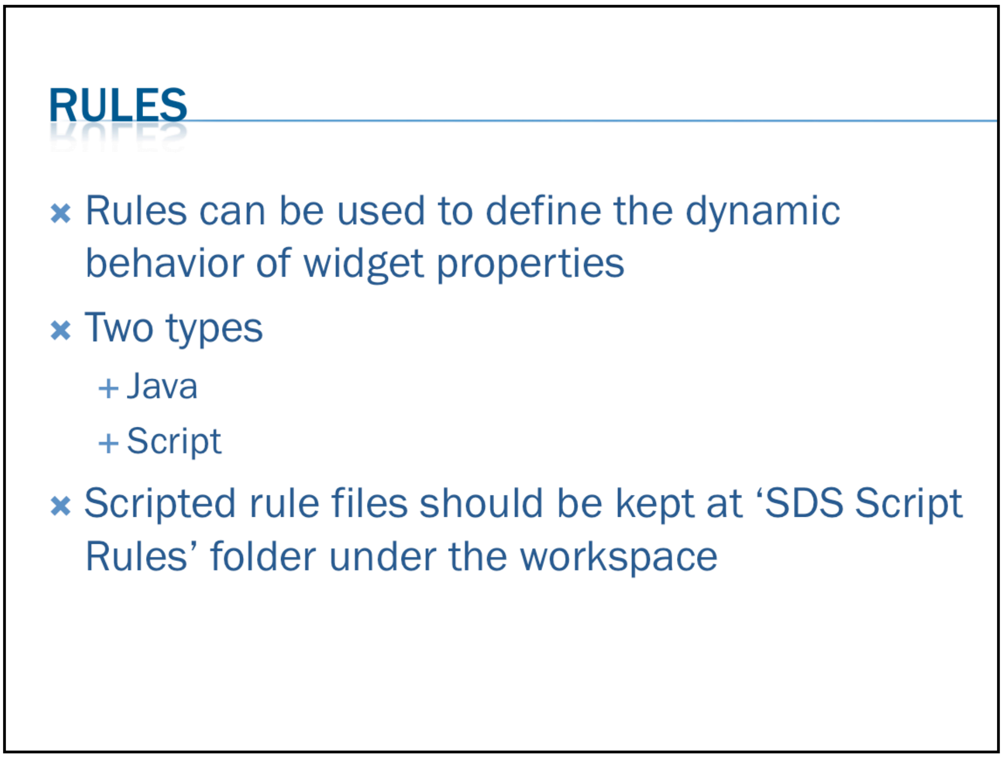
- Alias is a macro that can be used instead of long PV name or syntax
- Each widget can have several aliases ( e.g. for displaying several plots on strip chart)
- Alias can be forwarded to a new display



## CONNECTION AND CONDITION STATES

- Color can be customized for these
- Right click on background color properties to configure dynamic aspects
- Next
- Colors can be set here
- Try out

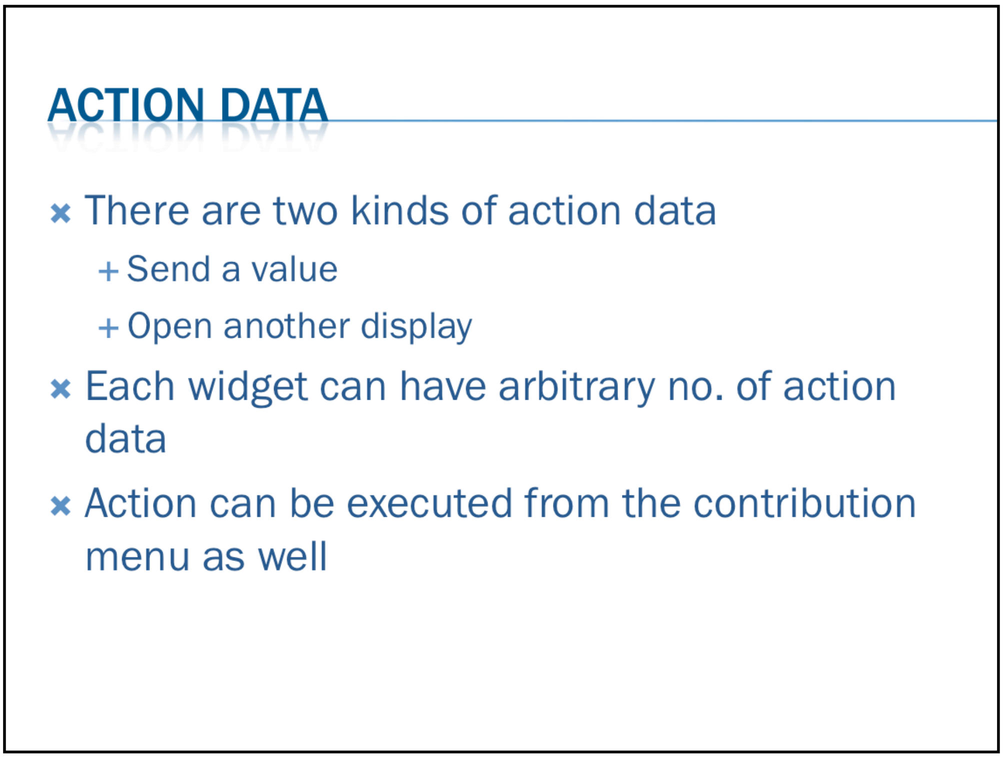
•Color can be customized for these
•Right click on background color properties to configure dynamic aspects
•Go to Next
•Colors can be set here



## RULES

- Rules can be used to define the dynamic behavior of widget properties
- Two types
  - Java
  - Script
- Scripted rule files should be kept at ‘SDS Script Rules’ folder under the workspace

- Rules can be used to define the dynamic behavior of widget properties
- There are two types of rules
  - Java
  - ECMA/Java Script
- Scripted rule files should be kept at ‘SDS Script Rules’ folder under the workspace
- It is recommended that JavaScript rules should be used for configuring dynamic properties instead of Java, as no compilation is needed in this case



## ACTION DATA

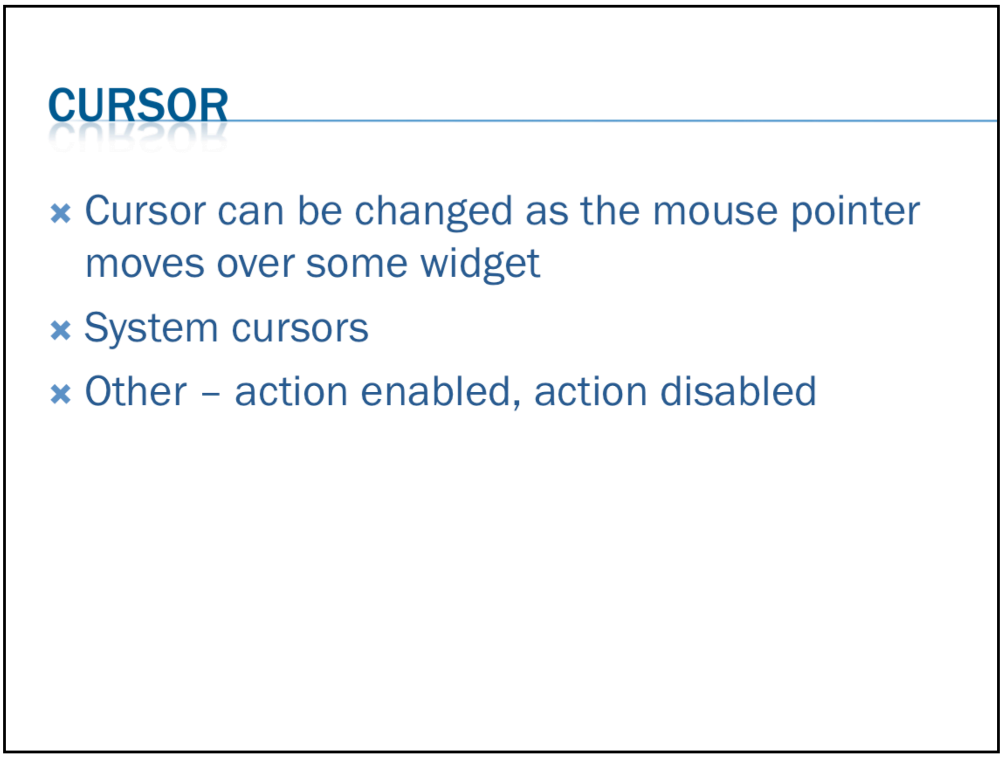
- There are two kinds of action data
  - Send a value
  - Open another display
- Each widget can have arbitrary no. of action data
- Action can be executed from the contribution menu as well

Action data setting defines the action which is performed when a widget is activated (i.e say a button is clicked)

Actions can be of two types
•Sending value
•Open a display

Each widget can have  arbitrary no. of action data

Action can be executed from the contribution menu as well. The contribution menu is invoked by right clicking a widget -> CSS ->
<contribution menu>



## CURSOR

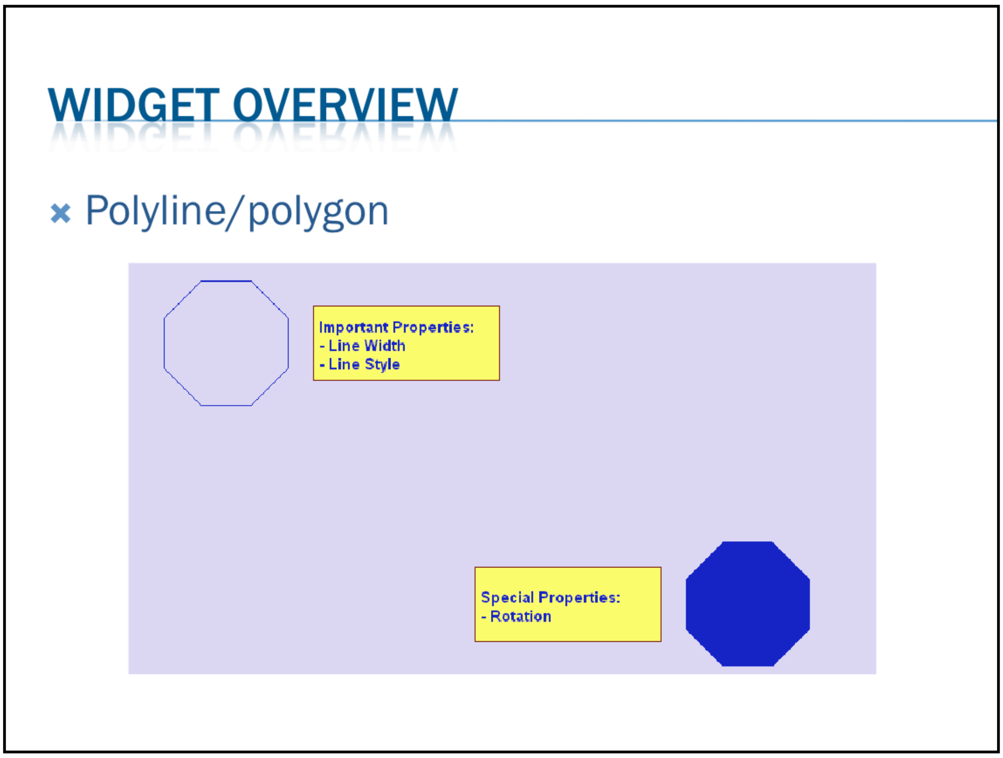
- Cursor can be changed as the mouse pointer moves over some widget
- System cursors
- Other – action enabled, action disabled

Cursor can be changed as the mouse pointer moves over some widget

Widget properties have a field for changing cursor

There are two kind of cursors

1.System cursors
2.Other – action enabled, action disabled



## WIDGET OVERVIEW

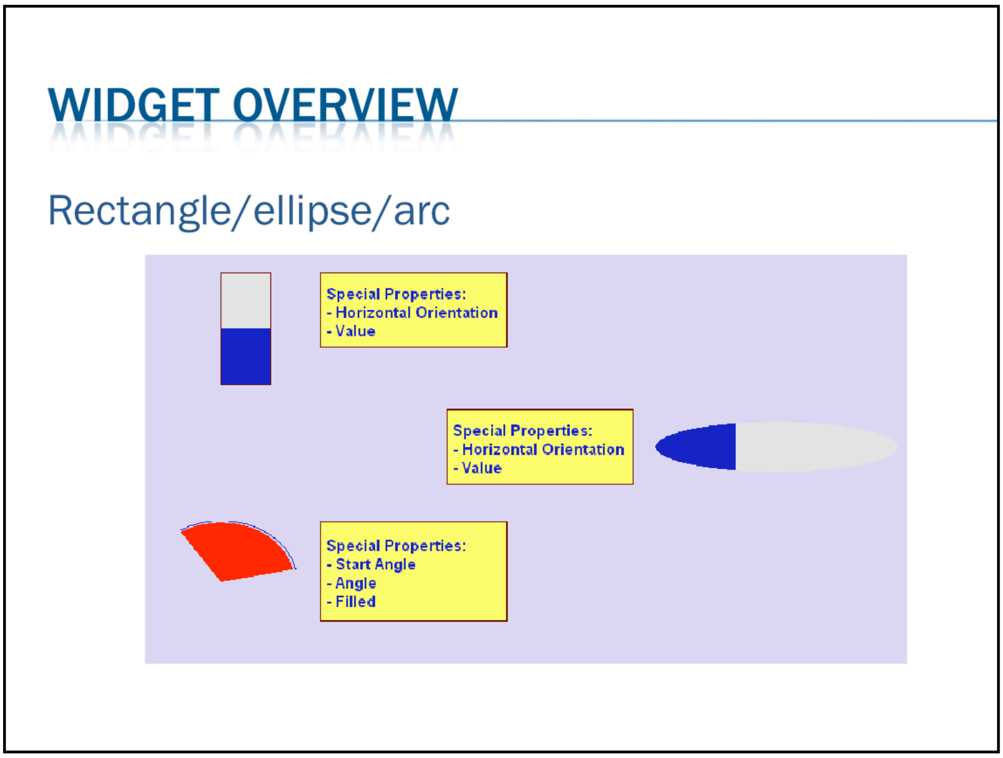
- Polyline/polygon

Important Properties:
- Line Width
- Line Style

Special Properties:
- Rotation

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



## WIDGET OVERVIEW

### Rectangle/ellipse/arc

Special Properties:
- Horizontal Orientation
- Value

Special Properties:
- Horizontal Orientation
- Value

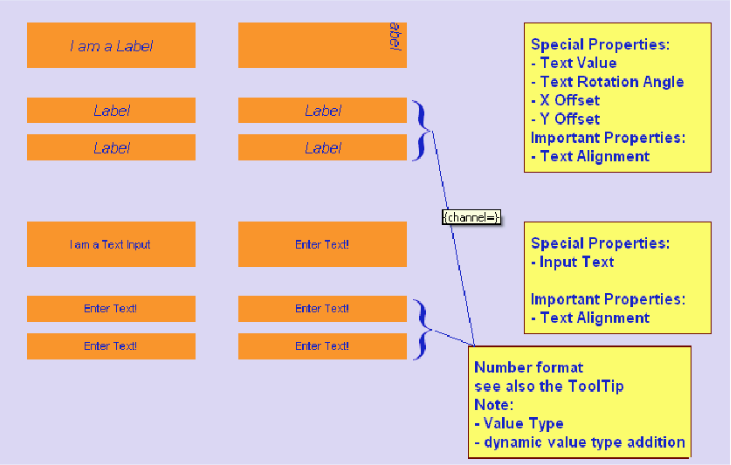
Special Properties:
- Start Angle
- Angle
- Filled

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf

## WIDGET OVERVIEW

### Label/ text input



Special Properties:
- Text Value
- Text Rotation Angle
- X Offset
- Y Offset

Important Properties:
- Text Alignment

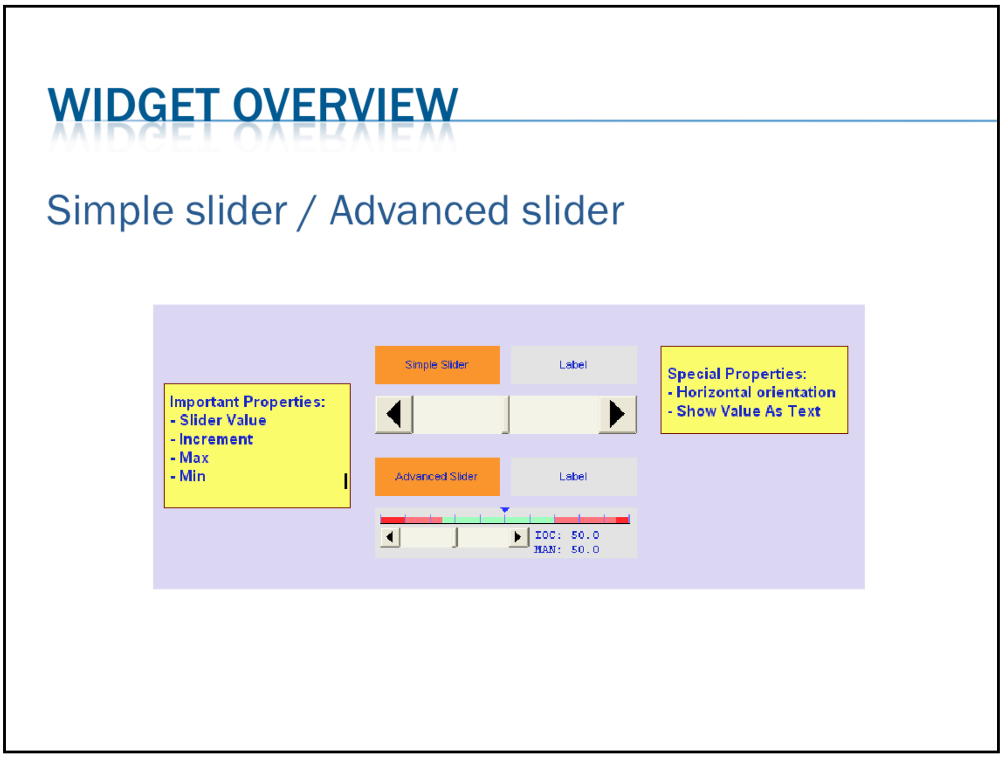
Special Properties:
- Input Text

Important Properties:
- Text Alignment

Number format
see also the ToolTip
Note:
- Value Type
- dynamic value type addition

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



# WIDGET OVERVIEW

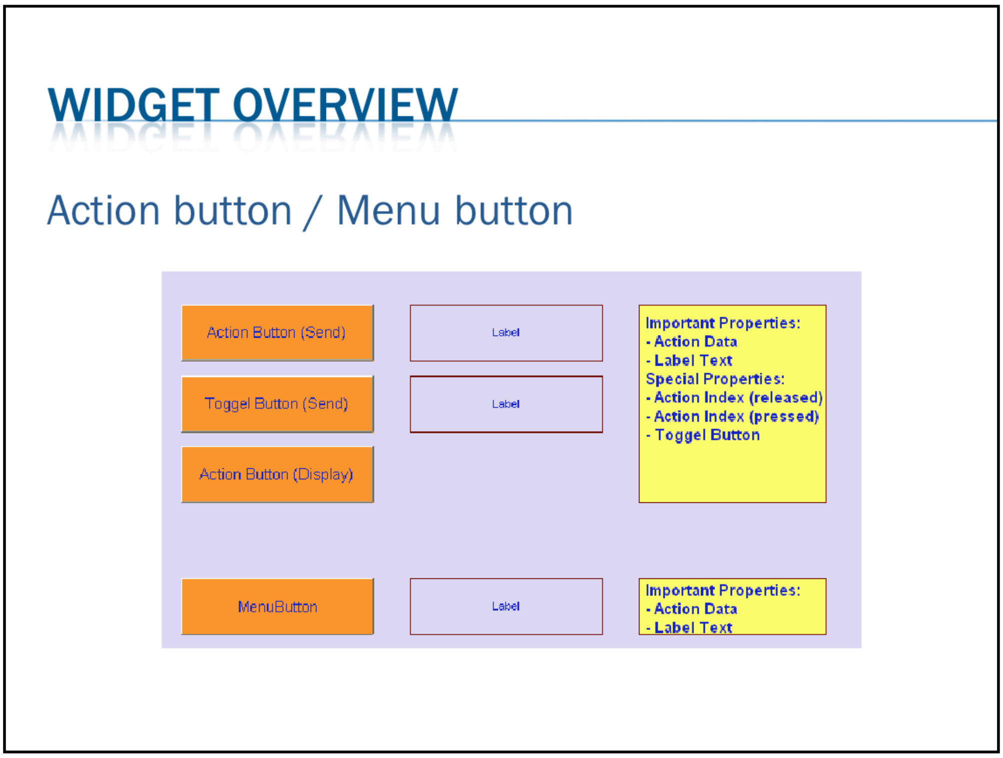
## Simple slider / Advanced slider

Important Properties:
- Slider Value
- Increment
- Max
- Min

Special Properties:
- Horizontal orientation
- Show Value As Text

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



## WIDGET OVERVIEW

### Action button / Menu button

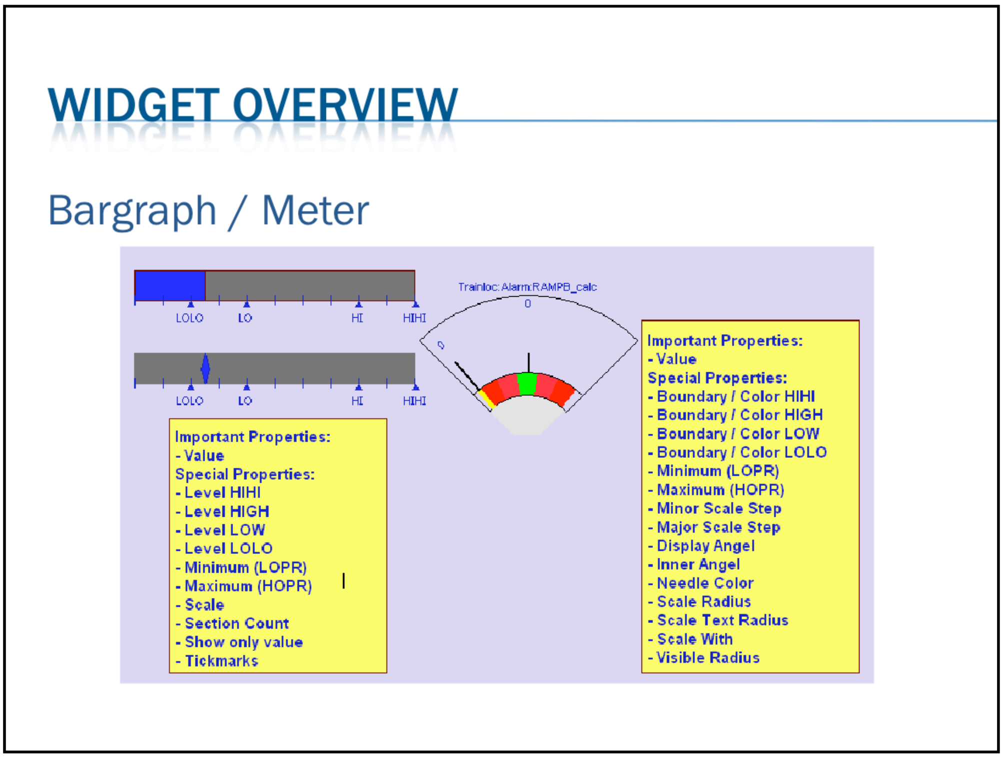
Important Properties:
- Action Data
- Label Text

Special Properties:
- Action Index (released)
- Action Index (pressed)
- Toggel Button

Important Properties:
- Action Data
- Label Text

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



# WIDGET OVERVIEW

## Bargraph / Meter

Important Properties:
- Value

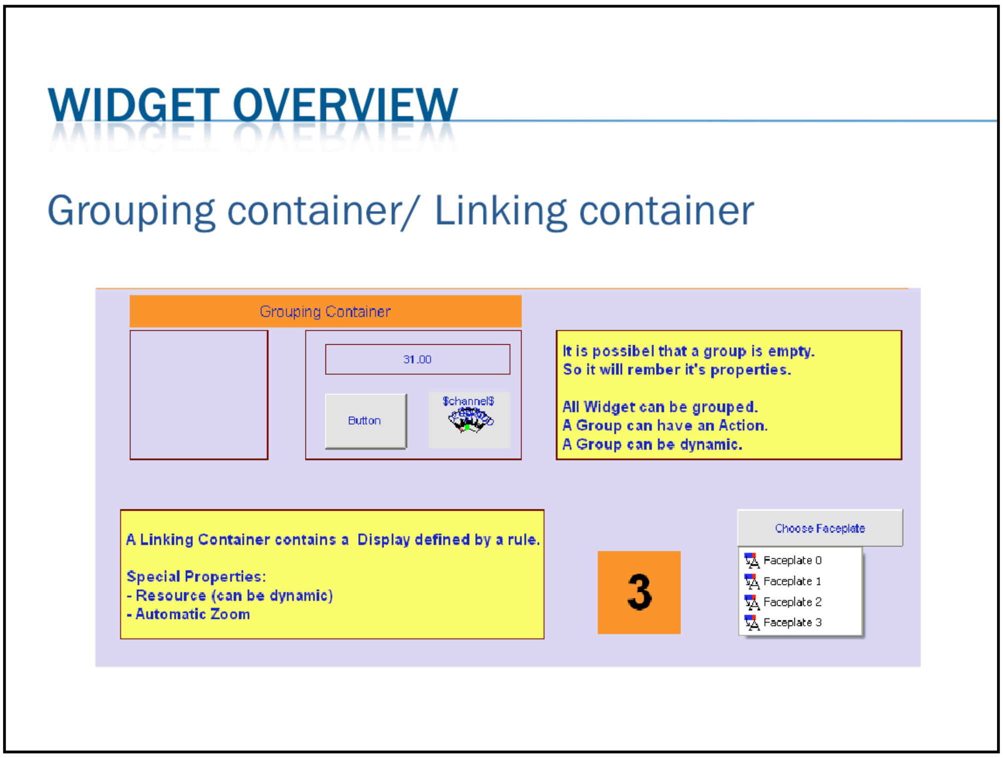
Special Properties:
- Level HIHI
- Level HIGH
- Level LOW
- Level LOLO
- Minimum (LOPR)
- Maximum (HOPR)
- Scale
- Section Count
- Show only value
- Tickmarks

Important Properties:
- Value

Special Properties:
- Boundary / Color HIHI
- Boundary / Color HIGH
- Boundary / Color LOW
- Boundary / Color LOLO
- Minimum (LOPR)
- Maximum (HOPR)
- Minor Scale Step
- Major Scale Step
- Display Angel
- Inner Angel
- Needle Color
- Scale Radius
- Scale Text Radius
- Scale With
- Visible Radius

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



# WIDGET OVERVIEW

## Grouping container/ Linking container

It is possibel that a group is empty.
So it will rember it's properties.

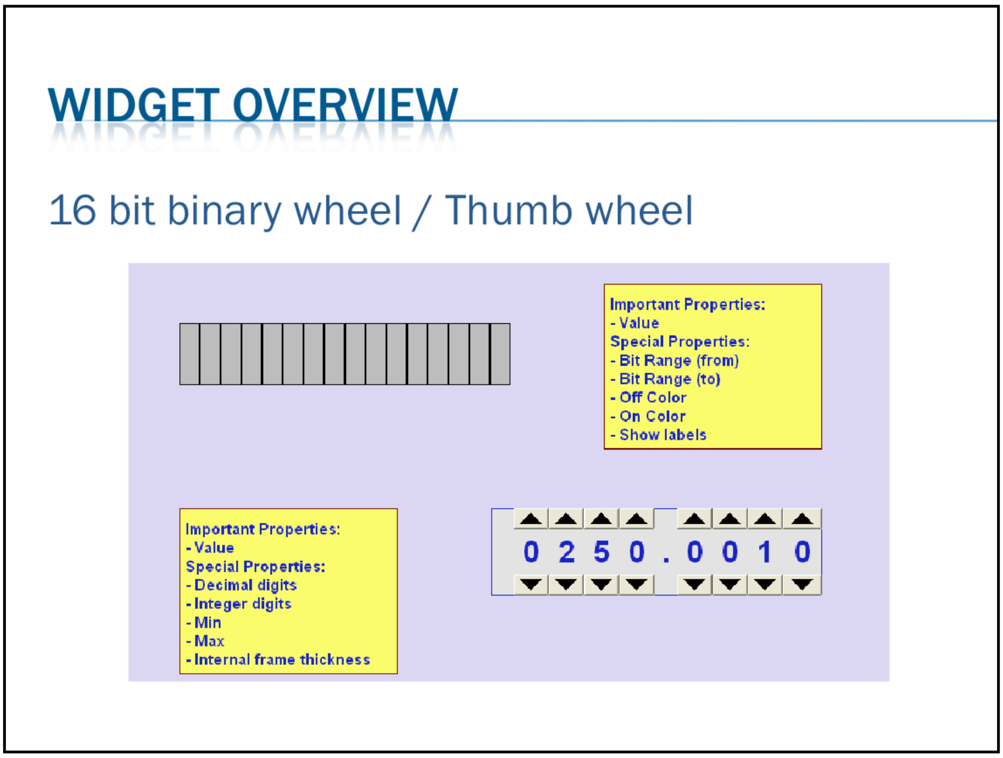
All Widget can be grouped.
A Group can have an Action.
A Group can be dynamic.

A Linking Container contains a Display defined by a rule.

Special Properties:
- Resource (can be dynamic)
- Automatic Zoom

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



# WIDGET OVERVIEW

## 16 bit binary wheel / Thumb wheel

Important Properties:
- Value

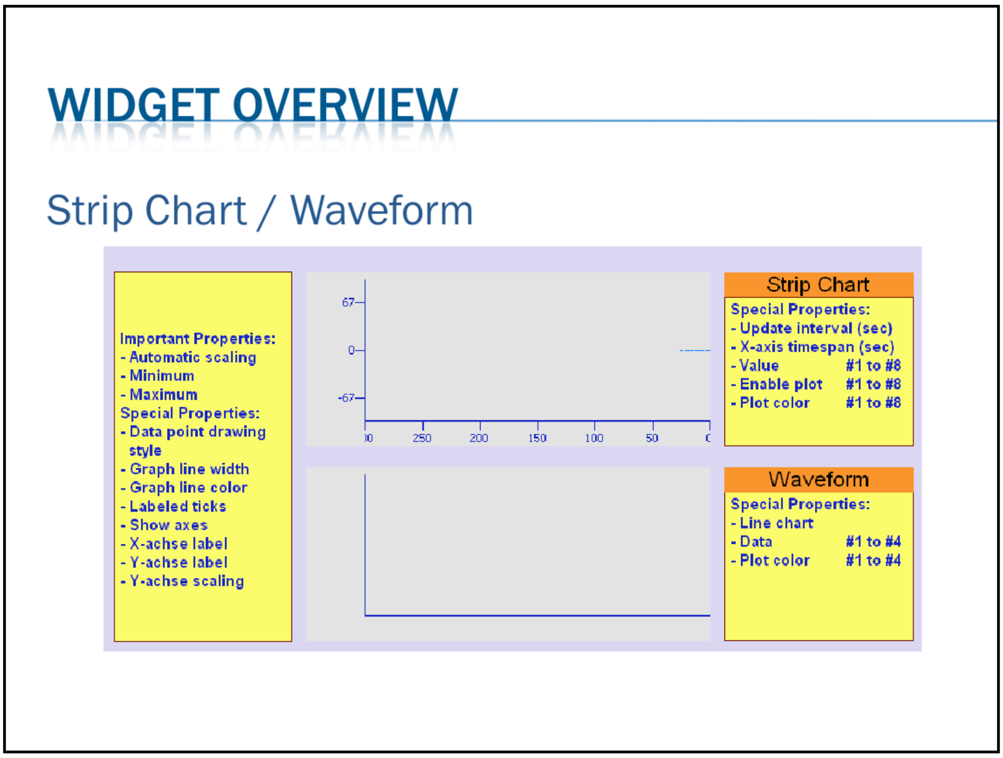
Special Properties:
- Bit Range (from)
- Bit Range (to)
- Off Color
- On Color
- Show labels

Important Properties:
- Value

Special Properties:
- Decimal digits
- Integer digits
- Min
- Max
- Internal frame thickness

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



# WIDGET OVERVIEW

## Strip Chart / Waveform

Important Properties:
- Automatic scaling
- Minimum
- Maximum

Special Properties:
- Data point drawing style
- Graph line width
- Graph line color
- Labeled ticks
- Show axes
- X-achse label
- Y-achse label
- Y-achse scaling

Strip Chart

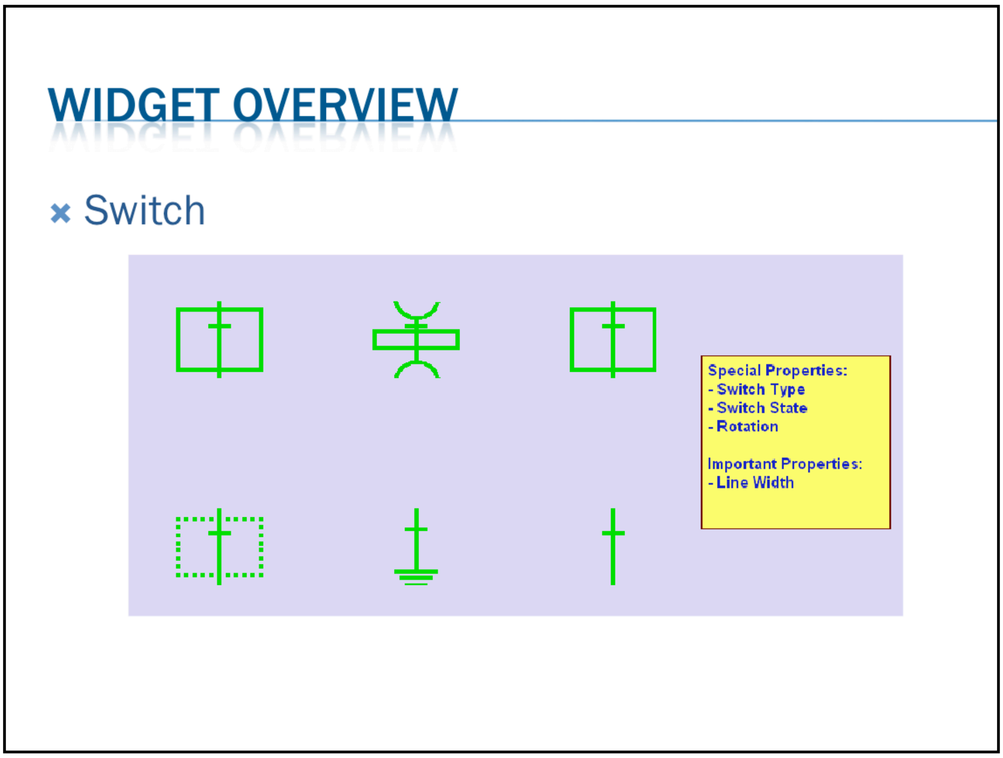
Special Properties:
- Update interval (sec)
- X-axis timespan (sec)
- Value #1 to #8
- Enable plot #1 to #8
- Plot color #1 to #8

Waveform

Special Properties:
- Line chart
- Data #1 to #4
- Plot color #1 to #4

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



## WIDGET OVERVIEW

- Switch

Special Properties:
- Switch Type
- Switch State
- Rotation

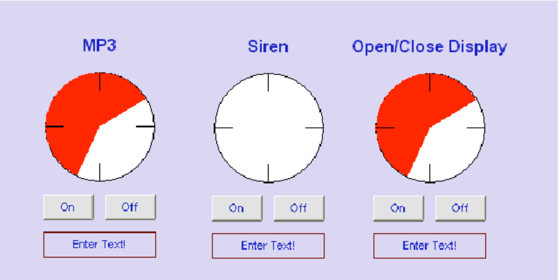
Important Properties:
- Line Width

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf

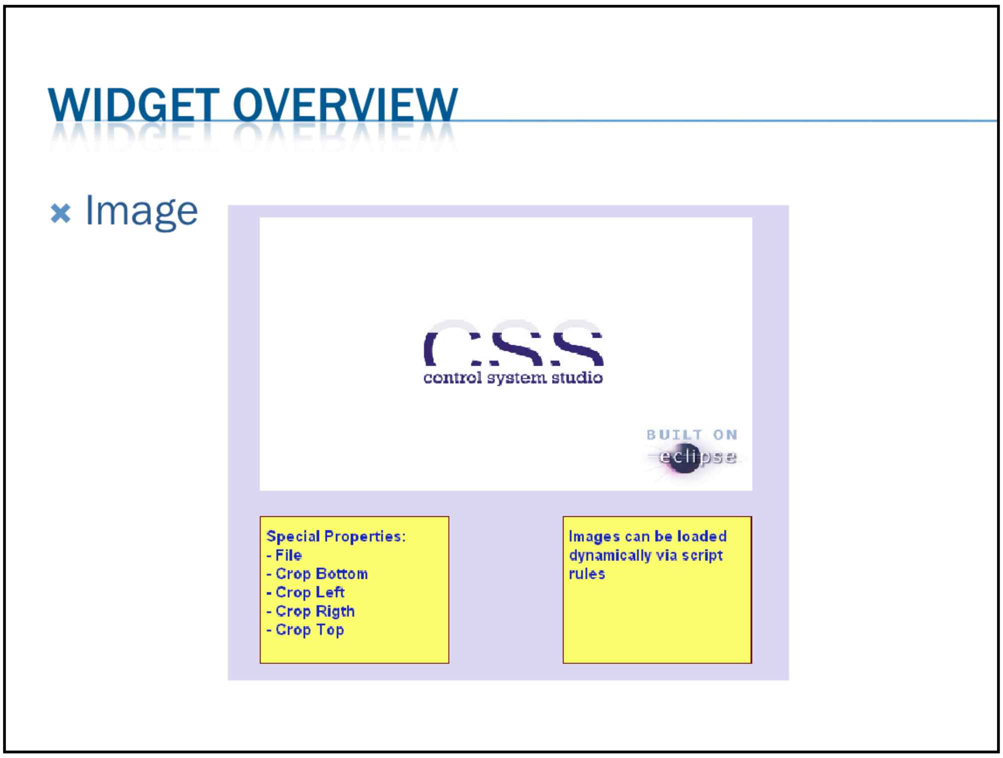
## WIDGET OVERVIEW

- Timer



Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf



## WIDGET OVERVIEW

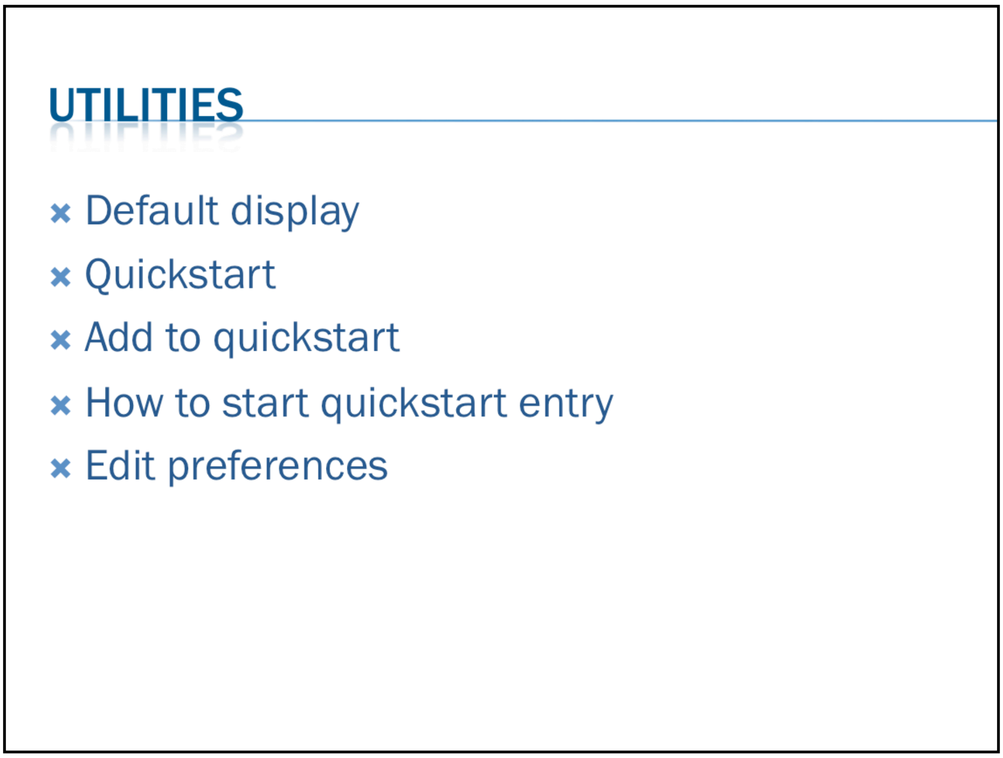
- Image

Special Properties:
- File
- Crop Bottom
- Crop Left
- Crop Rigth
- Crop Top

Images can be loaded dynamically via script rules

Detailed documentation is found at

http://css.desy.de/content/e1576/e2369/SDS_Widgets_V0.10-1.pdf

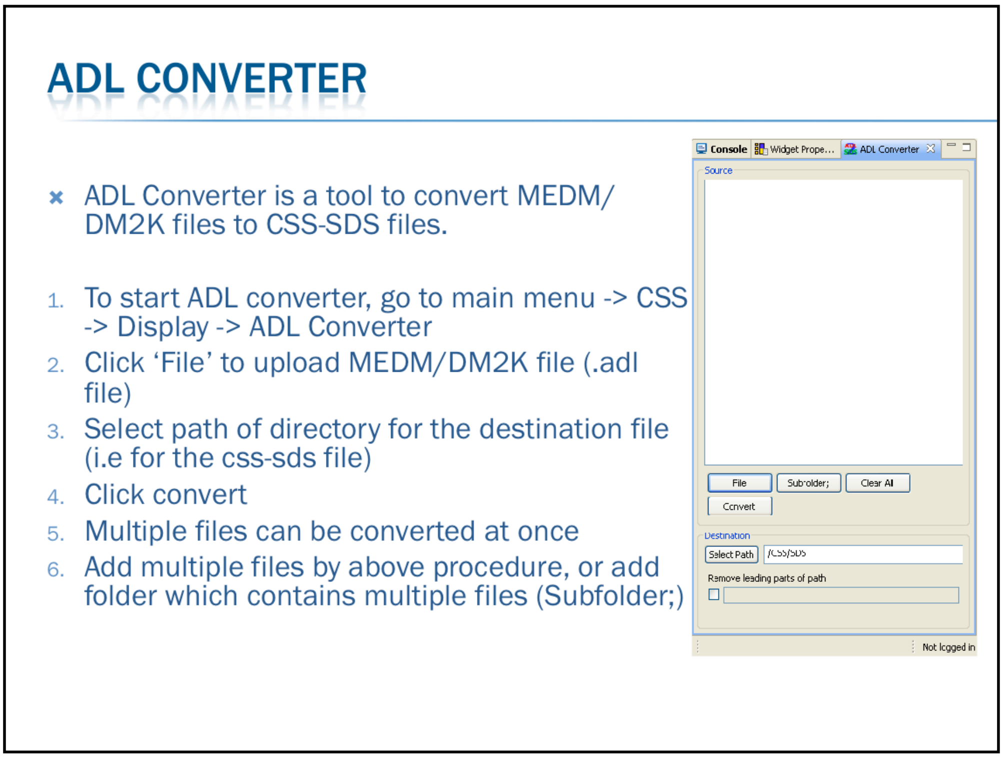


## UTILITIES

- Default display
- Quickstart
- Add to quickstart
- How to start quickstart entry
- Edit preferences

1. Default display is the default SDS file which opens through the contribution menu (open display)
2. To set the default display go to main menu -> CSS -> Preferences -> CSS Applications -> Display -> Default Display
3. Set the default file and the alias name

4. Quickstart menu is used to add shortcut to run the SDS files directly.
5. The SDS files added to quickstart menu will directly open in execute mode
6. To add files to quickstart menu, right click the SDS file in navigator pane -> add to quickstart
7. To invoke displays directly from quickstart, go to main menu -> quickstart -> (click file name)
8. To edit quickstart preferences go to main menu -> CSS -> Preferences -> CSS Applications -> Utilities -> Quickstart



## ADL CONVERTER

- ADL Converter is a tool to convert MEDM/ DM2K files to CSS-SDS files.

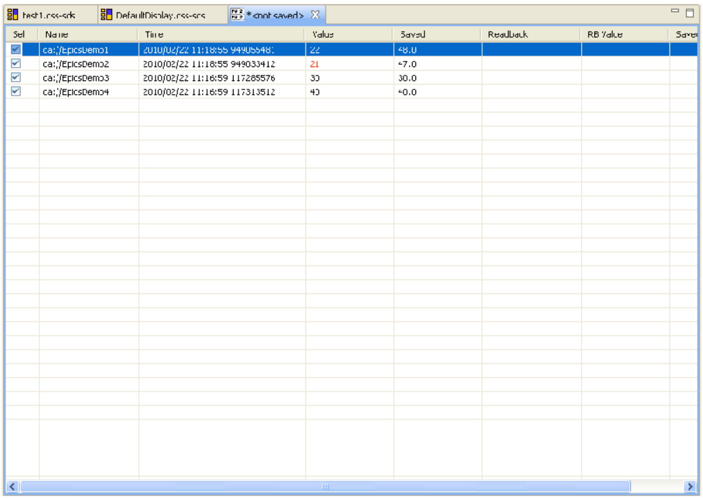
1. To start ADL converter, go to main menu -> CSS -> Display -> ADL Converter
2. Click ‘File’ to upload MEDM/DM2K file (.adl file)
3. Select path of directory for the destination file (i.e for the css-sds file)
4. Click convert
5. Multiple files can be converted at once
6. Add multiple files by above procedure, or add folder which contains multiple files (Subfolder;)

**What is the ADL Converter**
The ADL Converter is a CSS PlugIn that converts Control System Displays. This converts only from ADL-Format to the Synoptic Display Studio format from the Control System Studio.

**Use the ADL Converter**
The handling of the ADL Converter is very simple. First click the “File" button to choose the ADL-Files which you want to convert. The chosen files are displayed at the list and are all selected. Second click the "Select Path" button to choose the target path at the Workspace. And at last click the "Convert" button to convert the ADL-Files. Only the selected Files in the list are converted.

**New Conversion**
To convert other set of ADL-Files, clear the list by "Clear" button and choose the new ADL-Files and a new target workspace path. Then start the new conversion

# PV TABLE



| Sel | Name | Time | Value | Saved | Readback | RB Value | Saved |
|---|---|---|---|---|---|---|---|
| ☑ | ca://EpicsDemo1 | 2010/02/22 11:18:55 949055481 | 22 | 48.0 | | | |
| ☑ | ca://EpicsDemo2 | 2010/02/22 11:18:55 949033412 | 21 | 47.0 | | | |
| ☑ | ca://EpicsDemo3 | 2010/02/22 11:16:59 117285576 | 30 | 30.0 | | | |
| ☑ | ca://EpicsDemo4 | 2010/02/22 11:16:59 117313512 | 40 | 40.0 | | | |

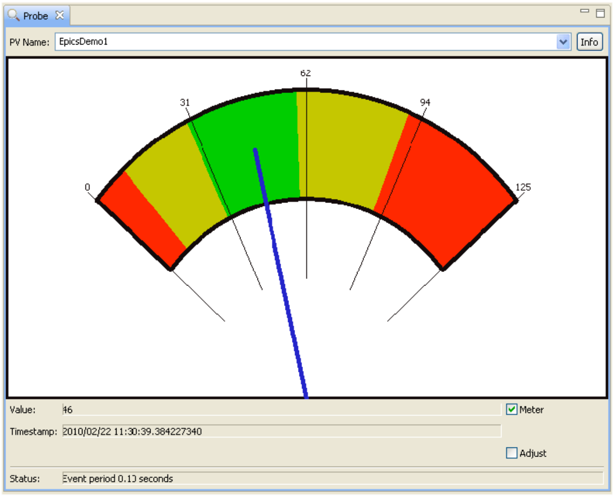
The PV Table provides a tabular view of PV names and their current value. One can start and stop live value updates. In addition, one can take a "snapshot" of current values, which gets saved when saving the PV table document. The PV table display indicates current values that differ from the "snapshot" values in red.

One can configure the update rate as well as the threshold for indicating differences between the current values and those from the snapshot.

To start with PV table

1.Go to main menu -> CSS -> Display -> PV Table
2.Right click the empty area in the table ->
3.Write the PV name to be monitored, go on adding names
4.A green LED symbol at the top icon bar is for starting the updates in PV table.
5.The update rate can be configured by right click on the PV table -> config

## PROBE



PV Name: EpicsDemo1

Value: 46

☑ Meter

Timestamp: 2010/02/22 11:30:39.384227340

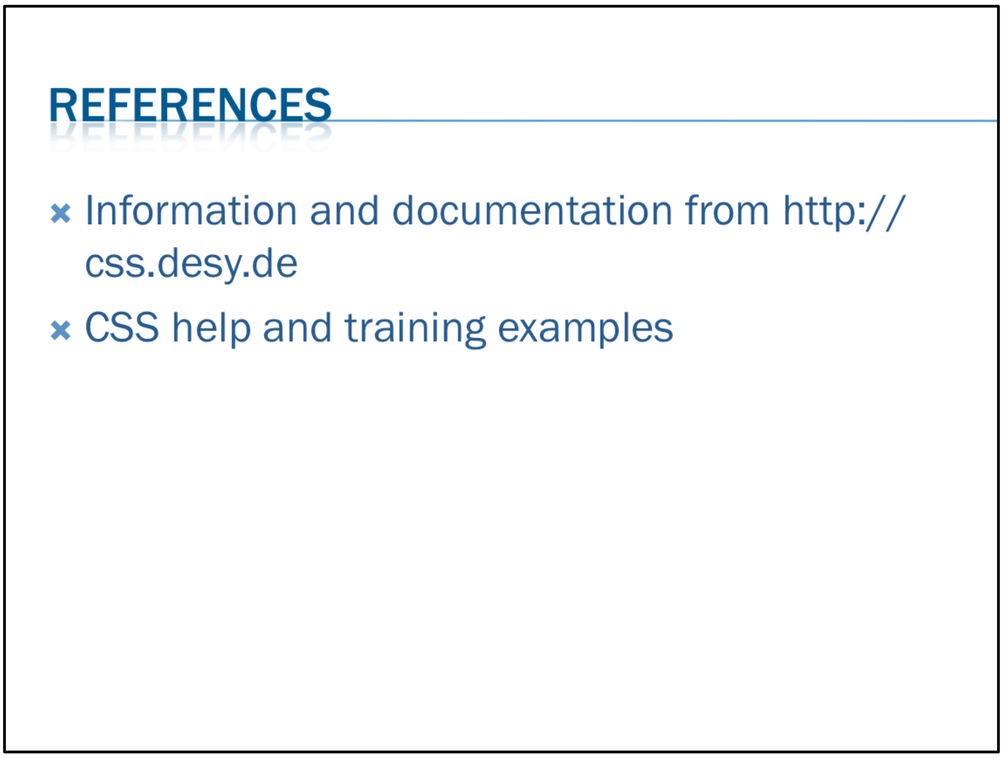
□ Adjust

Status: Event period 0.1) seconds

**Overview**
The Probe tool allows basic reading and writing of PVs.

**Usage**

1.Enter a name into the PV name text box and enter. The tool will display the current value of the given PV together with time stamp and status.
2.The 'Adjust' check box opens a dialog for writing a new value to the PV.
3.The status bar provides error messages. If all is OK, it displays a slowly averaged update rate of the PV.
4.It also displays alarm zones on the meter
5.The meter can be disabled also from the ‘Meter’ check box



## REFERENCES

- Information and documentation from http://css.desy.de
- CSS help and training examples