

## Abstract

SESAME is a third generation synchrotron light source under construction near Amman (Jordan). It is expected to begin operation in 2016. SESAME's injector (Microtron) and pre-injector (Booster Ring) have been commissioned. Commissioning of the storage ring is expected in 2016. The control system at SESAME is based on EPICS. EPICS IOC's are used for the servers. Control System Studio (CSS) is used for the clients. CSS BEAST alarm handler is used to identify all the critical alarms of the machine including configuration and visualization. This paper presents the architecture and design of the CSS BOY graphical user interfaces (GUIs) and CSS BEAST alarm handler for the different subsystems. It presents the standards followed in the development of SESAME's clients. SESAME will use an archiving tool based on CSS to access process variable history.

## CUSTOMISED CSS

- A custom build of Control System Studio (CSS) based on V.3.16 has been implemented.



- Archive system and alarm handler plugins have been integrated to the CSS custom build.
- A thumbwheel function has been added to the input box widget, which provides a compact fine-tunable control to the set values and it replaces the old thumbwheel widget (A digit of a set value is marked and changed by using the arrow keys of the keyboard.)



- A new feature for showing the CSS screens name on the title bar of each screen.
- When multiple CSS windows are opened, only one instance of identical windows is allowed at a time.

## SESAME OPI STANDARDS

### Windows

- Name property must be set (which is used as a window's title).
- Same background color specified in color.def should be used.
- Header should be white color. It should contain SESAME's logo and a window's title.

### Widgets

- Text Update: This widget is usually used for monitoring getter values. It should have a transparent background. Its border style should be Etched Style.
- Text Input: This widget is mainly used for setting PV values. It should have the system's default background color. Its style should be Native. Thumb Wheel Mode should be set if the value is numeric.
- LED: This widget is used to show devices on/off state, interlocks, limit switches and possibly other Boolean signals. Its color should convey the type of signal shown according to the color standards. Its size should be 20x20 pixels.
- Switch (custom widget): It is used mainly to turn devices on and off, although it can also be used for other stuff (e.g. valve open/close command).

### Colors

- Color definitions are present in the file color.def within the workspace. This file contains mappings between names and colors, defined as rgb values.
- Current listing in color.def is shown in the table below.

Name	red	green	blue	color
Background	220	220	220	-
Readyto Background	220	220	220	-
Group Title	0	0	0	-
Error Off	60	20	20	-
Error On	240	5	5	-
Start Off	20	60	20	-
Start On	5	240	5	-
Limit Switch Off	60	60	20	-
Limit Switch On	240	240	5	-

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## ARCHIVING SYSTEM

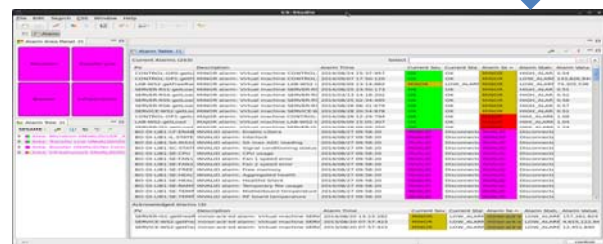
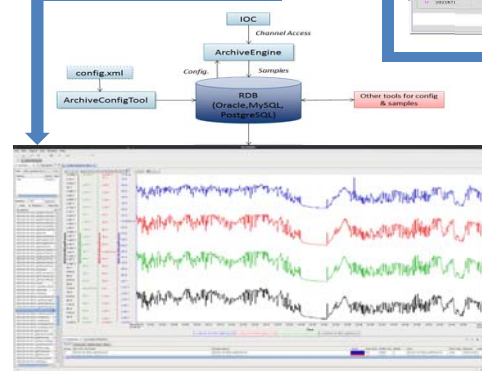
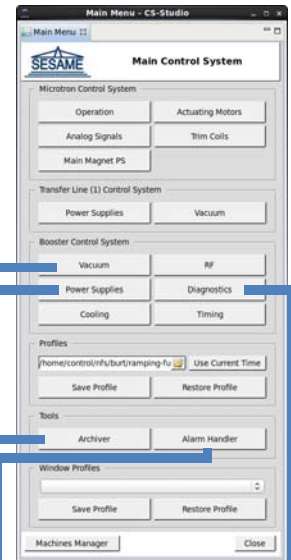
- SESAME has integrated the BEAUTY (Best Ever Archive Toolset Yet) archiving system.
- The system is divided into two parts:
  - Archive Engine: Installed on a virtual machine and setup to log the changes of approximately all PVs to a local PostgreSQL database. The value, alarm state and severity are recorded on each change.
  - Data browser: It is the client side and integrated into CSS as a plugin. It can be used to search for PVs and to plot them on a graph in any specific time interval.
- Figure beside shows the architecture of the archiving system with the data browser showing some vacuum readings.

## ALARM SYSTEM

- SESAME uses BEAST (Best Ever Alarm System Toolkit).
- The alarm engine is installed on a virtual machine on the machine network. It monitors PVs for alarms and sends update messages to the connected clients using an Apache ActiveMQ server.
- The client shows alarms divided by systems and subsystems in a hierarchical way where the state of the division is equal to the state of the most severe alarm underneath it.
- A notable feature is that alarms stay latched onscreen even if the fault is no longer present, until they are acknowledged. In this way the operator is made aware of both transient faults and steady faults.

## OPERATOR INTERFACES

- SESAME uses CSS BOY (Best OPI, Yet). It is an Operator Interface (OPI) development and runtime environment which enables monitoring and controlling of an EPICS system.
- SESAME has two environments of CSS; one is used for development in which OPIs can be edited and modified, and the other is used for deployment which disables modification and hides all the development windows of eclipse.
- SESAME's main OPI represents a launcher which can access all of the subsystems of the machine each on a separate OPI window.



## CONCLUSION

SESAME uses a custom build of Control System Studio (CSS) based on V.3.16. Archive system and alarm handler plugins have been integrated to the CSS. CSS adds a complete environment for the control room covering alarm management, archived data displays and operator interfaces. Work will continue to provide compact simple OPI screens for the operators.