THPV007

Fast Creation of Control and Monitor Graphical User Interface for PEPC of Laser Fusion Facility Based on

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OVERVIEW

- Integrated control for scientific experiment facility
- Software framework (ICSFF)
- Fast creation method for GUI in ICSFF

FRAMEWORK INTRODUCTION

- Fit for network control system structure
- ICSFF software framework divided into three layers:
  - device service layer
  - system service layer
  - integrated monitoring layer

GUI DESIGN

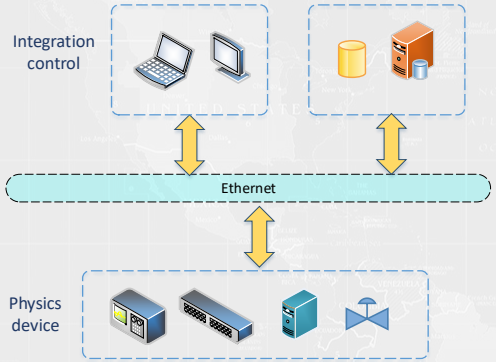
- Component-based
- Separation of data and UI
- Editability at runtime

GUI DESIGN-module

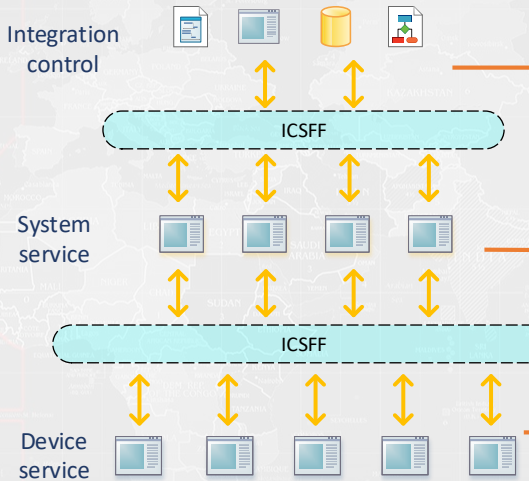
- Panel: editing and running scheme
- scheme: container of elements
- Element: the smallest unit in scheme
- attribute: element properties

FRAMEWORK INTRODUCTION

Typical large-scale scientific device control system structure



ICSFF software framework



Unified integrated operating environment for the control operation of the entire facility, enabling centralized control, monitoring and data managemen.

Combined control function for a single system under a bundle group

Software mapping for independent devices to implement device control, status acquisition, device diagnostics, and self-test, using device drivers.

General control system framework for the integrated control system design of this large-scale facility.

GUI DESIGN

- Component-based

  Our element library contains 23 optional controls, including flow nodes, buttons, text edit boxes, multiple selection boxes, text displays, LCD digital displays, status lights, progress bars, Ring marquee, pump, valve, pipe, image, curve, time and other types.

- Separation of data and UI

  Elements contains its own different attributes, which include styles, data access interfaces, and data display styles. element properties can be edited.

  Data access interfaces provide data processing function.

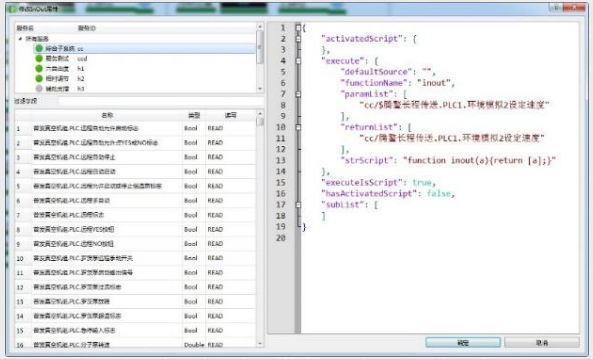
  Use script language to realize the connection between the elements and the data.

- Editability at runtime

  Make the software framework have a flexible operation mode.

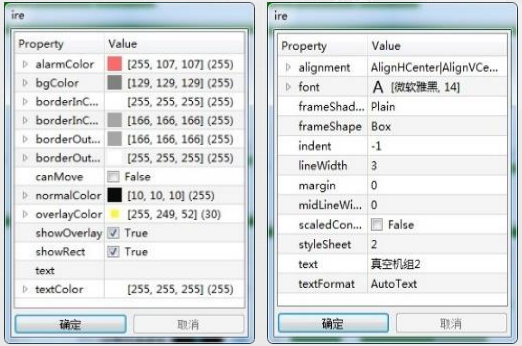
GUI DESIGN

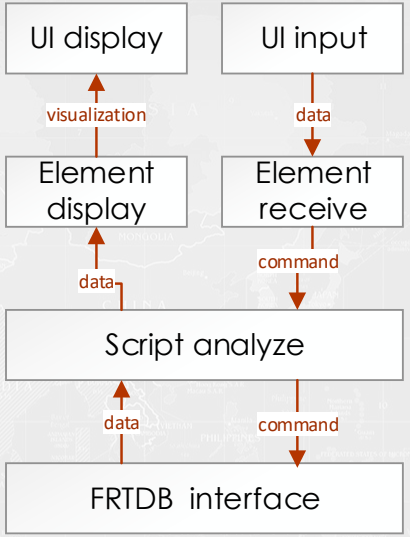
Data interface property configuration



Data display style attribute configuration

Element property editing interface





Data input and the data received in the interface are all translated through the script language, and then sent and received by the FRTDB interface, which realizes the separation of the control and the data.

GUI DESIGN-module

- Panel: editing and running scheme

  User drags the elements into the schemes, and arranges the elements in the editing function provided by the panel. Also it provide function like saving scheme to database, saving to file, loading scheme from file, and loading scheme from database.

- scheme: container of elements

  Users can create multiple schemes for facilitate. A scheme can become a system interface with independent functions.

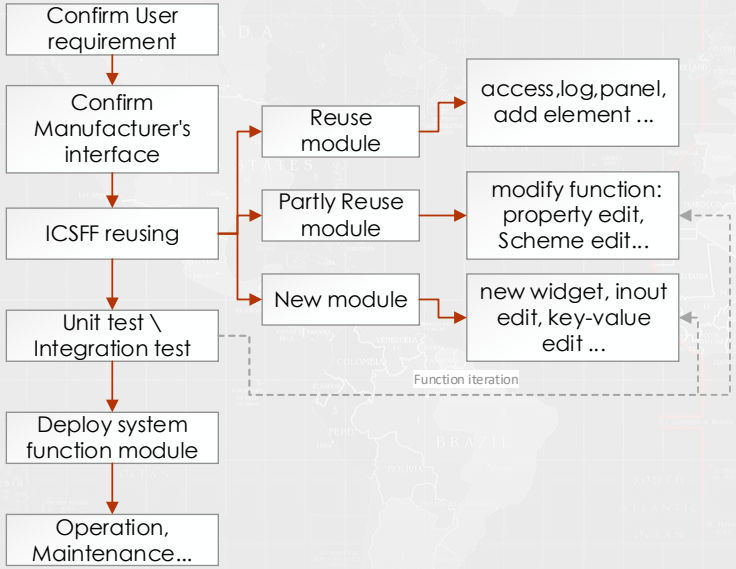
- Element: the smallest unit in scheme

  Users can edit the basic styles of the element such as the size, color, border, and font according to the needs of the display. At present, our element library contains 23 optional controls. Currently supports Qt controls, Iocomp controls and Quc controls.

- attribute: element properties

  Each type of element contains its own different attributes, which include styles, data access interfaces, and data display styles.

Software framework reuse process



- Confirming the requirements with the users
- Confirming the interface requirements with various manufacturers
- Then reuse of the ICSFF software framework to build the control system, and directly convert the fully reusable parts such as login, log, panel, etc. Utilize, some reusable parts such as program editing, attribute editing, etc., are changed according to user needs, and some functions and elements that are not available in the framework need to change the framework code or add new elements to meet user needs, and at the same time Reverse enriches the connotation of the software framework.
- After the iteration of unit testing and integration testing, the control system has completed the basic creation