SIMULATOR SOFTWARE FROM STA

An important development with the second generation STA software was the creation of 'virtual hardware' objects (or VHO's). These are building block components representing at their lowest level the basic building blocks of the simulation, for example switches, indicators, gauges. These objects are created dynamically as required for the target configuration.

VHO's contain five basic components of functionality.

1. The actual object status at any point in time.

2. The indicated object status at any point in time.

3. The failure modes that are modelled by the object.

4. Events that are raised by the object on appropriate change of state, or where services are required.

5. Interface to the 'real' hardware, switches, gauges, etc.. for interaction with the trainee, or 'soft' hardware using on screen displays. (This program will operate entirely offline from the actual ballast control desk).

The final (fourth generation) step in this work is to publish this interface through standard interface technology, and this is at two levels.

- Programmatic interface. Achieved using COM/Active X. Objects can then be directly addressed and built upon using standard languages such as Visual Basic. (Exporting the currently private C++ classes is also a practical opportunity).

- Operational interface. Since our 1995 development there has been better standardisation on instrumentation software protocols, and through which many SCADA and HMI/MMI applications can communicate. For example, DeviceNet, FieldNet, Modbus RTU/Plus, ProfiBus, DeviceNet. Example HMI/MMI applications are BridgeView from National Instruments, or Wonderware InTouch system. Their benefits are an open architecture allowing development of user interfaces, in particular in using IEEE standard presentations, and including presentation of trends and other data management functions. The virtual hardware objects will be extended to support one or more appropriate protocols allowing the complete display system to be established using standard software tools.

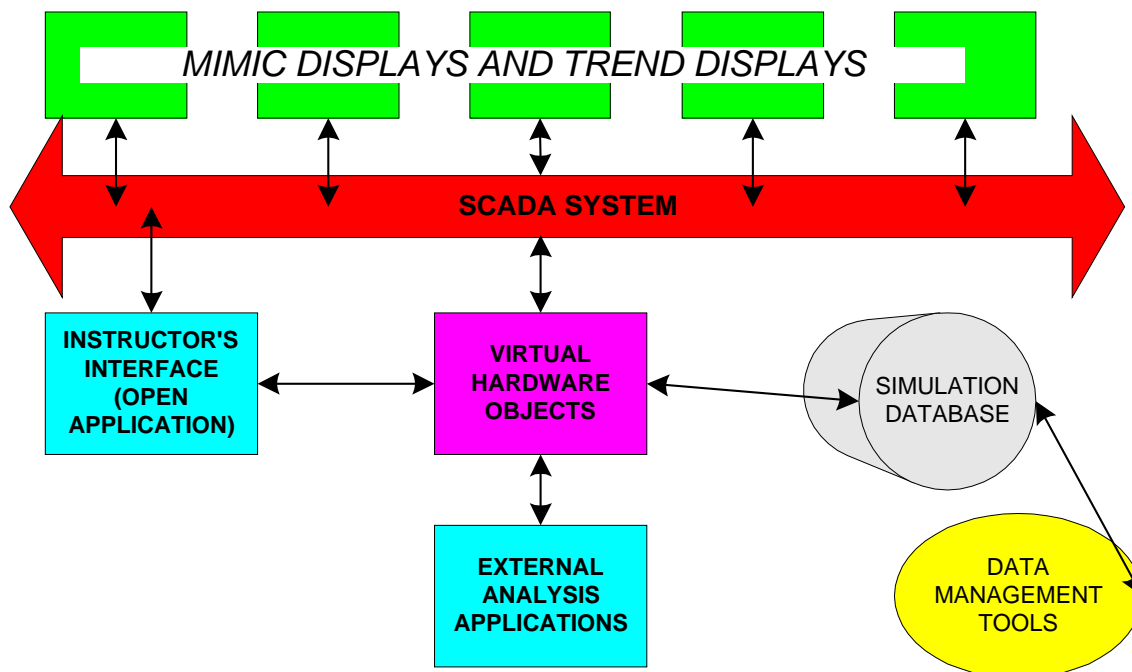We will also retain the direct access capability.
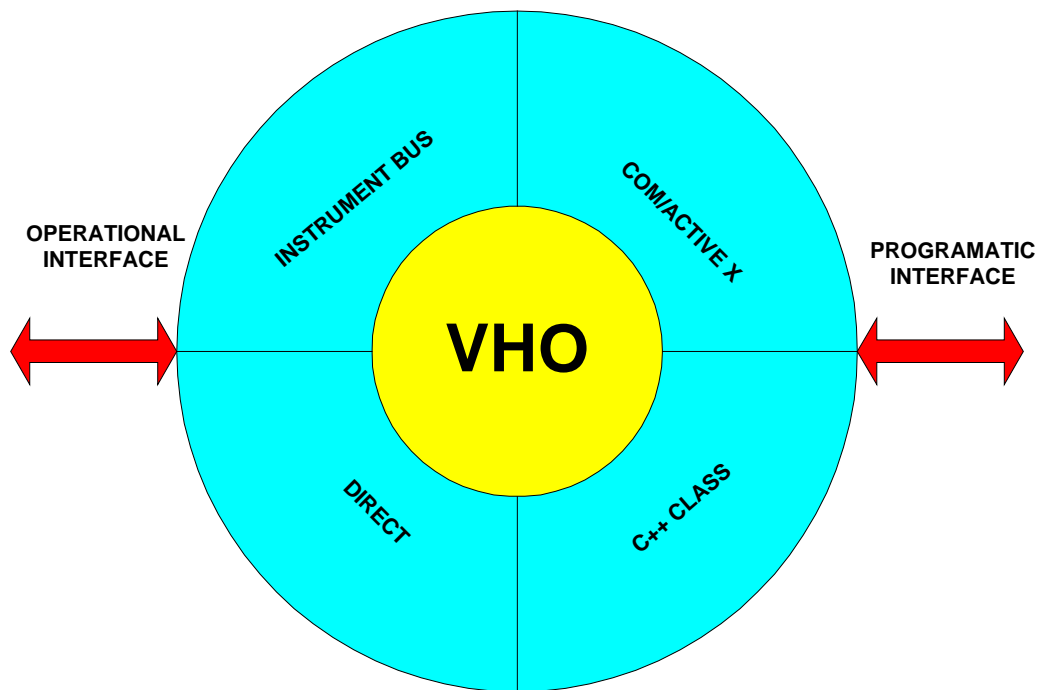
As mentioned previously, VHO objects also interface to hardware used in support of the simulation.

The VHO's establish the software building blocks that can then be put together in order to achieve the required simulation. As they are exported through COM/Active X,

- They can be quickly assembled in the required configuration by dynamically creating the objects with the required configuration and relationships.

- Their functionality is accessible and can be extended as required.

- Debugging of the whole simulation can be achieved without having to have any other supporting display systems.

At the operational level, external third party SCADA systems can be utilised for creation of operational displays

Using these techniques, the system development will be focused on the process of 'modelling' rather than 'code development', and can be undertaken using well defined specifications and documentation supplied in support of the external systems. It will also allow future development and/or extension by other than the original developer.

MIMIC DISPLAYS AND TREND DISPLAYS

SCADA SYSTEM

INSTRUCTOR'S INTERFACE (OPEN APPLICATION)

VIRTUAL HARDWARE OBJECTS

SIMULATION DATABASE

EXTERNAL ANALYSIS APPLICATIONS

DATA MANAGEMENT TOOLS

MIMIC DISPLAYS

1. Ballast network mimic. Display pages in order to present the full range of the ballast network and its status, but sub structured as appropriate.

2. Tank Contents. Display pages to present tank contents, in graphical form and/or tabular as required. Sub structured to present tanks in all categories of use.

3. Ballast pump. Display pages to present current, pressures as graphical gauges and/or tabular.

4. Moorings. Display pages to present primarily line tensions and lengths as graphical bar graphs and/or tabular. To include time history presentation.

5. Environmental. Display pages showing environmental summary (principally), wind, waves, current, and barometric pressure. To include time history presentation.

6. Marine. Display pages showing heading and overall rig motions, heave, roll, pitch. To include time history presentation.

7. Stability. Display pages showing draft, heel, trim, and small and large angle stability parameters. To include time history presentation.

8. Riser. Display pages showing rig position with respect to BOP, riser angle, ball joint angle, and vessel offset. To include time history presentation.

9. Drilling. Display pages showing principal drill information and status.

10. Helicopter. Display page to show motions at Helideck, heave, roll, pitch, and aviation parameters (principally) pressure and humidity.

11. Fire and other alarm status. Display pages to summarise status of fire and other alarms.

12. Damage. Display pages to show hull damage. (Possibly private to instructor).

What we advocate today, for simulation training, are background engineering computations, invisible to the instructor and trainees, but more comprehensive than often those that are performed for site-specific rig approvals by other engineering companies. It is vital, as far as we can see, that your simulator does not mislead you, your instructors, or your trainees. It is truly a simulator. You can do "WHAT-IF" simulations and it will tell you the answers.

You choose how to use it, and we will make sure it does what you ask, safely for the trainees, and accurately in engineering terms, for all. We enable this complicated software with a very robust tilt-table, to be made simple for all to use and understand.

Numerous sound effects are available to the instructor. They include:

- Helicopters, circling, landing, taking off, sitting running, etc.
- Explosions of different magnitudes
- Background industrial noise (many sounds selectable)
- Grinding metal
- Dropped Objects
- Collision sounds
- Personnel emergency sounds
- Warning sirens, etc.