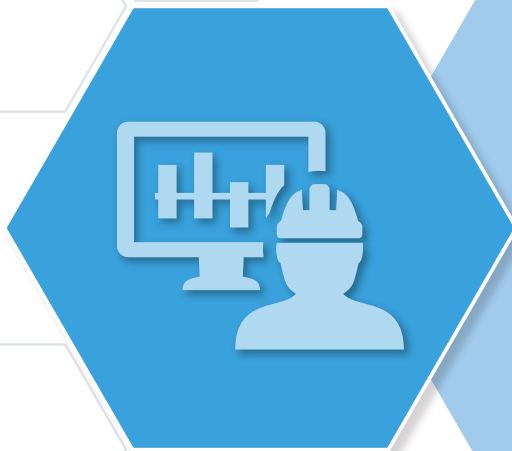


Operator Training Simulator

Omega **Land** *Trainer*



Connect people with the virtual plant

OmegaLand Trainer (Plant Training Simulator) connects a virtual plant reproduced by a dynamic simulator with the people involved in plant operation, achieving efficient, easily understandable, and deeper communication, thereby contributing to safe, stable, and efficient plant operation.



For Training **I**nstructors

Conduct Rapid Training Preparation

Normally, various preparations are required to carry out training. By using the windows provided exclusively for instructors by OmegaLand Trainer, it is possible, from an easy to understand user interface for training preparation, to know when and how to generate abnormalities for each device incorporated in Visual Modeler, how to set evaluation criteria for operation, how to create scenarios combining initial conditions and equipment abnormalities to standardize the training course, etc.

Conduct Efficient Training

Various functions are also required for the implementation of training, such as starting / stopping / terminating the training, monitoring operator operations during training and the process, making abnormal conditions occur according to the operator's level of experience, generating reports to summarize training results, and reviewing the operation contents after training. Because OmegaLand Trainer centrally manages the tasks that instructors carry out on the instructor windows, they can perform operation training efficiently.

For Plant **O**perators

High Fidelity Dynamic Simulator

OmegaLand Trainer uses the OmegaLand Visual Modeler dynamic simulator as an engine. Visual Modeler has high fidelity process reproducibility and is capable of performing dynamic calculations faster than in real time by using simulation models with plant level detail even for large-scale plants. Visual Modeler is based on the conservation law of mass and energy. Since Visual Modeler itself performs precisely mass balance, heat balance and pressure flow balance calculations without making any special definitions, it is possible to faithfully reproduce the behavior of an actual plant. As a result, operators can train in an environment that is comparable to operating an actual plant.

Same Operating Environment as Actual Plant

As an important element for realizing a more faithful OTS, it is possible to make use of graphic windows, trend windows, and control logic of DCS (Distributed Control System) and SIS (Safety Instrumented System) operator consoles that are used in actual plants. OmegaLand Trainer can connect with particularly high affinity to the Yokogawa Electric CENTUM/ProSafe-RS, a world famous integrated system for process control and safety instrumentation. As a result, since operators can receive training under the same environment as the monitoring operation environment in the instrument room of an actual plant, they can receive training just like in a real plant such as start-up and shutdown with an awareness of DCS operation methods and interlock safety instrumentation, or training in response to abnormalities.

Realistic Field Operations

The field operation windows integrated to OmegaLand Trainer are simulated by graphic windows with various functions for carrying out field operation training with a more authentic feeling. Through these field operation windows, the field operators can monitor and operate on-site valves and equipment in cooperation with operators who are performing the DCS monitoring operations as if they were at the plant site. Furthermore, as OmegaLand Trainer can easily be linked with 3D and virtual graphic software, it can also reproduce a plant site environment with a high degree of realism.

For **E**ngineers

Improved User Interface

The user interface of the engineering environment OmegaLand offered until now has not only been updated in OmegaLand Trainer to comply with the latest OS, but has also been revamped by adopting advanced UI technology. In addition, the user interface has been made more intuitive and easily understandable by integrating the UI operations that had until now been different for each function such as plant model development, graphic creation, execution management, and so on.

Easier to Understand, Simpler Plant Model Development and Graphic Creation

For plant model construction, the names of the parameters of each unit constituting the plant model have been changed from the notation by symbol that was used until now to a notation specifically expressing the meaning of the parameters, thereby improving the visibility and making it possible to build a plant model more smoothly. Furthermore, during the creation of graphics, most data items are automatically generated based on the information entered during plant model development, thereby dramatically reducing input tasks.

Editable even During Execution

Until now, in order to adjust the behavior of a plant model to specifications, it was necessary to modify its parameters by switching from the execution mode to the edit mode of the plant model, but in OmegaLand Trainer it has become possible to modify parameters without switching between modes. This greatly shortens the tuning work time which accounted for most of the plant model development, thereby shortening the construction time and improving the quality of plant models.

Improve communication skill for plant operation

OmegaLand Trainer not only enables learning plant operating procedures and troubleshooting methods, but also creates opportunities to pass on operating techniques and skills to young operators, including the processes that enabled experienced operators to acquire their experience and knowledge.

It is not just a system for operator training, but as an environment that enables operators to communicate more smoothly during the plant operation training cycle, it also contributes to the prevention of human error by reducing miscommunications between operators.

P preparation

1.Create Initial Conditions

In the OTS, the timing condition of the plant model and control logic is called the initial condition, and saving the condition to a file is called creating an initial condition. When starting training, other than the initial conditions that are prepared in advance, initial conditions can also be created as required after operating the OTS to states that suitable for the training content.

2.Define Malfunctions

A Malfunction is a kind of defect or abnormal condition that may occur in the equipment and instruments in the plant model. The malfunctions are determined by what kind of training the operators should perform.

3.Define Training Scenarios

A training scenario is defined according to the purpose of training.

A training scenario can be executed automatically as a single set such as loading an initial condition, activating a malfunction, and evaluating a trainee. Therefore, by defining a training scenario, it is possible to always carry out the same training and evaluation even if instructors change.

R eview

1.Evaluate

The windows exclusively for the instructor calculate and evaluate the trainees' operations based on the evaluation standards preset by the instructor. This will quantitatively evaluate whether a trainee operates by following the correct procedures, the amounts of change are within the allowable ranges, and operations are done within appropriate time limits.

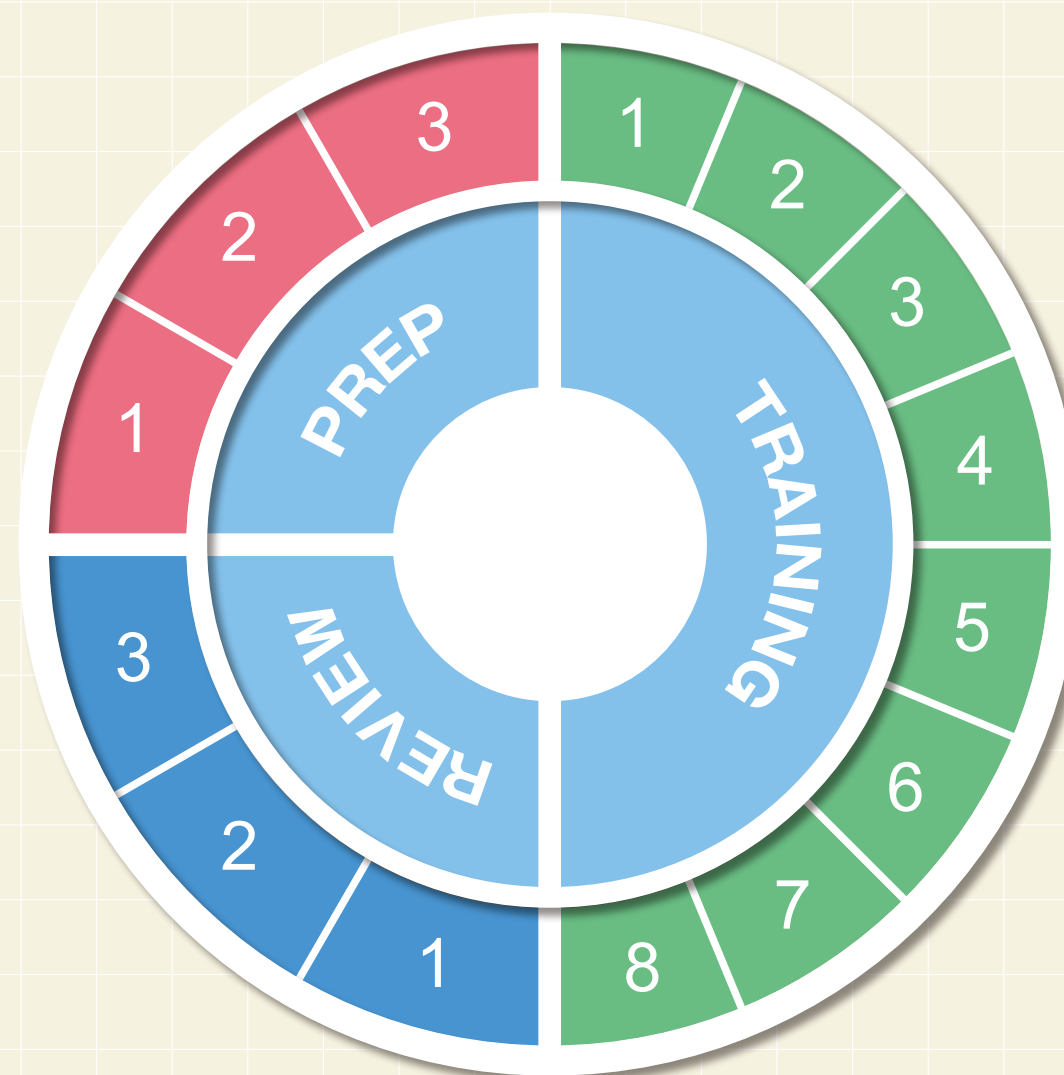
2.Replay Training Contents

By replaying training contents, instructors and trainees can review training sessions by reproducing trainee operations and process movements according to the progress of the training.

3.Create Reports

A report can include training conditions, trainee operation history, types of malfunction, training scenario configurations, evaluation parameters and their evaluation results. Instructors and trainees can review training sessions by looking at the contents of the created reports.

OmegaLand **Trainer**



Plant Operation Training Cycle

T raining

1.Start Suitable Simulator for Training

When selecting and starting a simulator definition file that matches a desired type of training, windows corresponding to roles are automatically started on each computer.

2.Register Operation Contents

Begin recording operation contents to conduct reviews by reproducing the operations carried out by trainees after completion of the training.

3.Execute Scenarios

Depending on the training contents, a scenario defined in the preparation stage is selected and launched. As a result, an initial condition is automatically loaded and the OTS is put in a predetermined state. Next, when malfunctions and evaluations are defined, malfunctions are executed and trainee operation evaluation is started.

4.Change Operation Modes

The OTS can change back and forth between the execution state and the frozen state at any required time. Instructors can explain and advise trainees about training contents while the model is frozen.

5.Change Timescale

It is possible to change the execution cycle of the OTS to a specified multiple of real time (1/8, 1/4, 1/2, 1, 2, 4, 8 times) according to operating conditions. Since the process behavior is reproduced even when it is executed at different timescales, efficient training can be done while allowing trainees to gain awareness of the process behavior.

6.Trainees Performs Operation

If the same operator console as in the actual plant is connected, trainees can train under the same monitoring and operation environment as the actual plant.

As a result, it is also possible to receive training by performing operations that normally cannot be done or by using functions that they have not yet experienced in the real plant.

7.Snapshot and Stepback

It is possible to temporarily store in a memory the state of the plant model and control logic during the execution of operation training, and also to return to previously saved contents by freezing the operation mode, thereby making it possible to reproduce the same conditions over and over again.

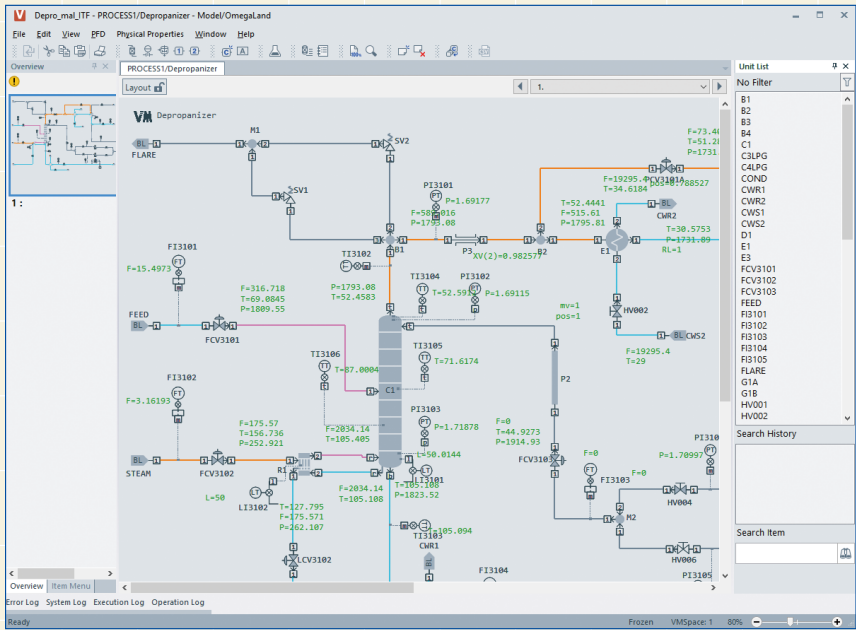
8.Replay

If replay is performed when a training condition is saved by a snapshot, it is possible to reproduce operations performed by the operator from the timing when the snapshot was taken.

Model Function

This function is at the center of OmegaLand and constructs and executes high precision manufacturing plant models. The model function OmegaLand Visual Modeler is equipped with the physical property calculations and unit operation models required for building manufacturing plant dynamic simulators including oil, petrochemical, chemical, oil & gas and other applications. Model construction can be done efficiently by a model construction window that allows intuitively performing tasks such as selecting units and placing them on the PFD window, setting physical connections and parameters such as size and performance parameters of each unit. Engineering efficiency has been improved at each stage by improving the editing function at the time of execution and adding an input support function on the data input window. In addition to process units that performs unit operations, it has instrument units that perform control calculations and the like, and it is possible to build a plant model including the control system only by using the model function. It is possible to build an emulation DCS type training system by using a control system built on the model. The model function not only can handle large-scale plant model such as a model that covers an entire ethylene production system, but also has a high-speed computing capability that can perform real-time calculations essential to a training system and even accelerated simulation.

※ The performance of accelerated simulation depends on the performance of the computer to be used and the scale of the simulator to be built.

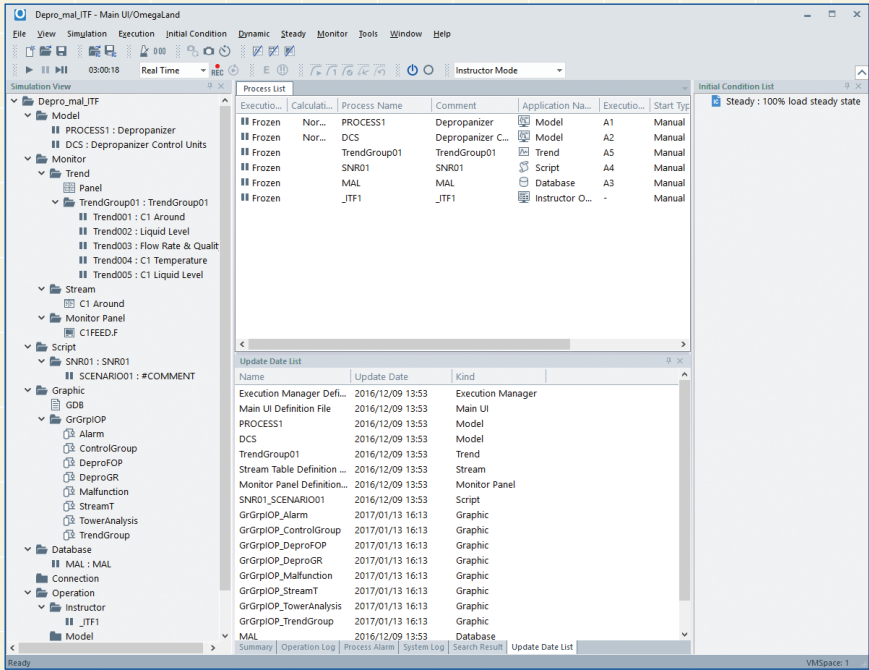


Database Function

A database function that can be used in real time is provided. In addition to accumulating historical data, new variables can be defined to be referenced from graphic functions and to calculate tag values using calculation formulas. It also has functions such as alarm processing using graphic functions required for emulation DCS.

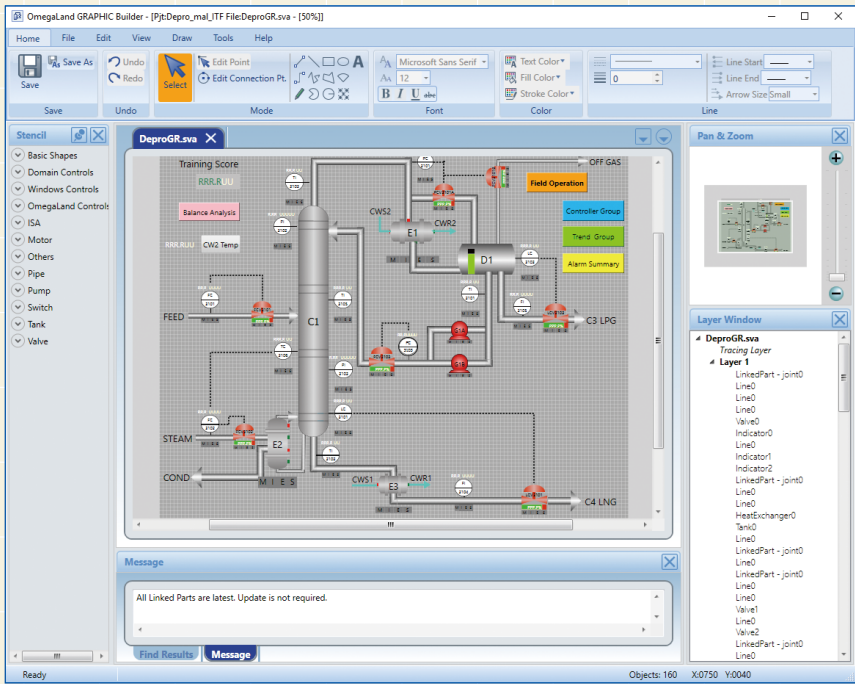
OmegaLand Main UI

Main UI is the user interface for centralized control of simulation projects. Here, settings related to simulations are made, and calls to each function are made to define the model. The functions registered in the simulation are also started and stopped from here. It has become easier to build and manage the simulator than in previous versions, because it is now possible to manage all the information on the simulator in a unified manner.



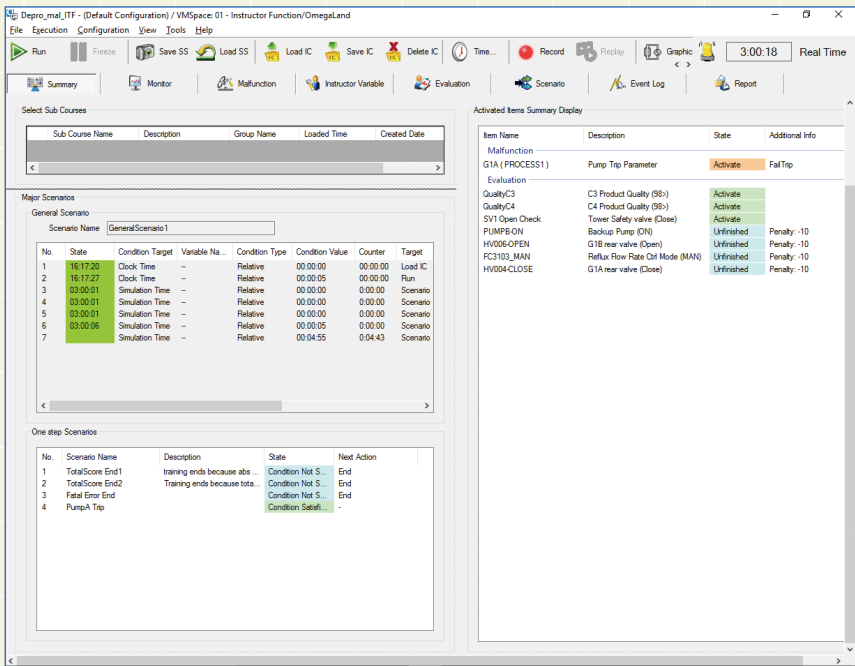
Graphic Function

The graphic function has the functions required for display and operation on graphic windows in a training simulator, and they can be efficiently constructed on the Graphic Builder window. Also, in the configuration of the emulation DCS type, the DCS operation window is realized by the graphic function. In OmegaLand Trainer, in addition to DCS monitoring and operation, a training system connected to field operations can also be provided. The graphic function can be used for field operation windows, information panels of instrument rooms that are not displayed on the DCS, etc. In conjunction with the instructor function, training functions can also be used such as for executing malfunctions or setting external conditions from instructor graphic windows.



Instructor Function

In addition to training management functions such as starting, freezing, saving and loading conditions, and changing the simulation timescale of a training system, various functions required for instructors are also provided. The provided functions include a monitor window that monitors every state in the simulator in one place, an instructor variable window that sets external conditions of the plant model, a malfunction window that expresses equipment failures, an evaluation function of the training results, a report function, a simulation recording and replay function, along with scenario functions that can combine and execute these functions. By adding summary windows and brushing up each function, an easier to use and more functional interface for instructors is now provided.



Connection Function

Connectivity with external subsystems is provided to build full-scale training systems connected to DCS simulators and to construct expressive plant models connected with other simulation programs and the like.

System Configuration

OmegaLand Trainer offers two types of operator training simulators (OTS), the DCS application usage type and the emulation type.

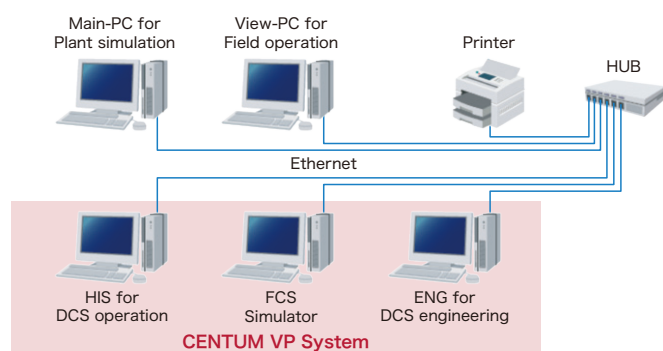
DCS Application Usage Type

It simulates the same software as the DCS and SIS installed in a real plant on a personal computer and connects it to the plant model simulated by the plant simulator. Because it uses the same applications of DCS and SIS as real plant, the operability and controllability of the actual plant are faithfully reproduced. The figure is an example of connecting with Yokogawa CENTUM VP and ProSafe-RS.

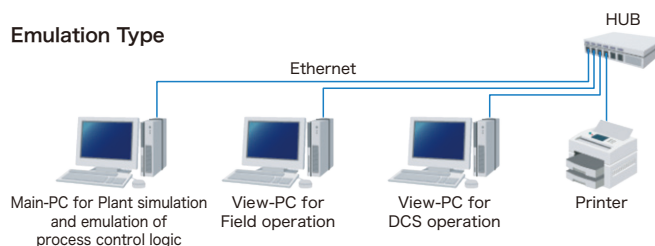
DCS Emulation Type

All the control logic and graphics windows implemented on DCS and SIS as well as the plant model are built on OmegaLand Trainer. Because control logic, monitoring operation windows and the plant model are all built on OmegaLand Trainer, this type of OTS has a high portability, so it can be used for understanding the process itself. The figure is an example of a typical emulation type OTS.

DCS Application Usage Type



Emulation Type



System Requirement

Please refer to our company website for System Requirement.

URL : https://www.omegasim.co.jp/contents_e/product/ol/overview/#bm4

Product Education Course

In order to better understand OmegaLand Trainer, we offer the following product education courses. All courses are conducted in a classroom style by lecturers, and you can acquire knowledge about OmegaLand Trainer by lectures and experiential workshops. Please contact us for schedule and details.

Course Name	Duration	Course Contents
OmegaLand Visual Modeler Basic Course	3 days	OmegaLand Visual Modeler operation methods and plant model building methods
OmegaLand Visual Modeler Advanced Course (*)	3 days	OmegaLand Visual Modeler custom unit creation and customization of physical property calculations
OmegaLand Trainer Basic Course (*)	2 days	OmegaLand Trainer emulation type OTS building methods
OmegaLand Trainer Advanced Course (*)	3 days	OmegaLand Trainer DCS application usage type OTS building methods

*: Prerequisite: completion of OmegaLand Visual Modeler Basic Course



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