CoreCode, the (Real-Time) Manufacturing Message Bus is a basic solution that enables you to perform diverse productions at the site, surveillance/control of operating equipment and data collection more systematically. Using standard interface provided through Common Interface Layer, different models or other diverse equipments and the upper IT system can be easily connected and integrated, ensuring flexible action for additional connection or expansion of equipment. Independent from specific manpower or equipment of specific vendor on the basis of standard, this optimal solution shows excellent recycling and convenient maintenance, ensures flexible expansibility, integration with the existing IT environment and consistent processing and integrated data control ranging from surveillance/control of data on the site to integrated system of the whole company.

Characteristics of solution

**Processing Based on Real Time Java**
- Real-time processing based on Real Time Java (IBM, SUN RTS authentication)
- Ensuring high capacity, high speed processing (throughput/reaction time)

**Standardized Interface**
- As development is performed in the unit of component as per Data I/O and architecture whose business logic is thoroughly separated, standardized codes developed with the minimized dependence on developer
- Connecting standard interface data in the form of unifying all data of system/equipment of different models, consistent interface of system is maintained and the complexity of control and interface is minimized

**Improving Productivity of development**
- Supporting diverse development tools which are intuitive and easy to use (GUI Modeler, Debugger, Remote Agent, Adaptor Register, Web Admin, Code Templates, Code Tutorials, etc)
- Providing embedded component verified in the site (about 100 units)
- Providing APIs to develop custom component

**Flexibility and expansibility**
- Very maintenance and reduction of operation cost thanks to constructing system that is independent from vendor and developer
- Embodying Plug & Play mode of components which can be reused
- Supporting diverse communication protocols such as OPC, SCAP, TCP/IP, XML, HTTP, RMI, MODBUS, RS232/422/485, etc
- Supporting interface for PLC, DCS, etc that is prevalently used in industry including Mitsubishi Melsec, Siemens s7, LS Industry, delta, ABB, etc
- Embodying model of diverse communication architecture models by providing message transmission mode of 1:N, 1:1, M:N type necessary for requirement of integration
- Ensuring flexibility and expansibility for change in the future by enabling developer to easily develop or reuse component through the provision of infra based on Adaptor Framework necessary for system connection

**Dualization and Load balancing**
- Supporting dualization of Active-Active and Active-Standy so that system can be operated without interruption even in abnormality
- Composing stable integration system by supporting Load balancing, monitoring disorder, Fail-over

**Optimal integration between Industrial Plant and Enterprise**
- Processing diverse drivers necessary to connect control layer (commercial PLC and equipment, etc) and Enterprise layer (commercial DBMS, Application, etc)
- Smoothly processing message in large capacity provided real time as indispensable factor in industrial plant with verified performance
- Adding user logic by Custom Function Call function to analyze and use Plant Floor data
- Supporting tool to develop adaptor on the online and offline in consideration of operation environment of industrial plant without power failure

namoo INC
Manufacturing Message Bus

Composition of solution

Providing standard adapter for industrial use
- Solving complexity of operation environment by providing standard adapter for industrial use of different equipments in each process, PLC and DCS
- Making future addition, replacement or improvement of equipment easier by providing standard interface
- Diverse adapters for equipment of each Protocol

Tool for supporting development
- As tool based on modeling to develop equipment of different model and system connection interface, it supports environment of integrated development of all processes including modeling, test, debugging, distribution, etc.
- Adaptor Modeler: Adaptor development, registration, control and testing tool
- Hospital Admin Tool: Tool that prevents error by monitoring process of developing adaptor

Processing engine
- As core engine, it is in charge of controlling Run-Time environment, system resources control, transaction control and login.
- Ensuring message routing, delivery and encoding/decoding transmitted/received data
- Supporting diverse standard communication protocols
- CoreCode Server: Standard / Enterprise

Agent for remote control
- Performing function of small middleware engine
- Connecting middleware server and interface
- Operating and controlling remote adaptor
- Function of remote maintenance and datalogging

Operating control/monitoring tool
- Diagnosing and monitoring all Web-Based system resources
- Statistics and analysis of monitoring materials
- Controlling by web and normalizing program in the case of abnormal solution
- Function to change, add and delete web-based remote program

Process to apply solution

Analyzing communication data
- System for communication
  - Analysis of protocol in use
  - Analysis of communication data
- Collecting Sample data
- Analysis of integrating and accepting device of different models

Designing operation Environment and adapter
- Designing architecture for each system and device
- Analyzing performance and load
- Designing Adaptor
- Designing data extracted for each equipment
- Designing communication format required by customer
- Defining storage and transmission method

Adaptor modeling and development
- Modeling engineering after selecting object in adaptor library
- When necessary, developing new adaptor and verifying reliability
- Registering adaptor lib

Operating CoreCode in linkage
- Registering and operating operation adaptor
- Collecting/extracting data and connecting transmission
- Monitoring the processing state
- Verifying reliability and stability of system

Maintaining CoreCode
- Setting plan of operation training and maintenance
- In case of abnormality, remote monitoring and diagnosis through Web
- Storing and analyzing log
Manufacturing Message Bus

**Composing software**
- **Web monitoring**
  - Server control module
    - State of adapter operation
    - Registering/deleting/performing/interrupting adapter
  - Remote control module
    - Registering/deleting/performing/interrupting remote agent

**Other system**
- Data linkage module
  - Using data loaded from another model or system
- Data analysis module
  - Extracting recipe for situation of operating target equipment and next processing
- Data loading module
  - DC to provide other system of the processed data

**CoreCode Server**
- Adaptor control module
  - Registering/deleting adaptor component
- Data communication module
  - Collecting data
  - Transmitting data
- Data processing module
  - Calculation and conversion as per business logic

**Remote agent**
- Data communication module
  - Transmitting data
- Adaptor control module
  - Operation/suspension of adaptor
  - Registration/revision of adaptor

**Device**
- PLC
- SCADA/HMI
- Robot
- DB
- OPC
- Maintenance System

**Main functions**

- **Collecting data and providing information in real time**
  - Collecting data from equipments on the sites such as PLC/DCS, etc in real time
  - Storing data in DB for each time and storage limit
  - Providing information standardized to other model and upper system

- **Efficient control of received data**
  - Storing received information as file, DB and memory so that they can be used as data analysis materials

- **Function of remote data control**
  - Engineering system data to be collected by installing simple program in the system for interface

- **Security**
  - Providing data security by providing function of encoding and decoding
  - Protecting from the risk of information leakage and damage by applying security protocol through certificate

- **Monitoring and measure for disorder**
  - Informing to operator by fax, message, voice, email, etc in the case of communication disorder such as program disorder, inability of system to send data, abnormal operation of server and communication disconnect, communication disorder of network and measuring equipment
  - Monitoring server, network, measuring equipment, communication state
  - Automatic restoration of Connection Pool function in the case of passage network problem

- **Function of filtering and back up of data**
  - Providing data filtering function to keep data precision in receipt and transmission and to prevent the accumulation of defective data
  - DB backup (Clustering S/W)
  - Storing collected data eternally by regular backup of DB and analysis materials
Adaptor Modeler

- Adaptor Modeler is an Integrated Development Environment that supports all processes of developing an adapter, including development, test, debugging, and distribution.
- Adaptor Modeler enables development by moving adapted models that are already distributed in connection with CoreCode Server to local PCs, so that components can be dragged and dropped through pattern modeling based on the adapter framework to model business rules and define the attributes of relevant components.
- The developed adapter can be independently driven in Modeler without operating server for test and verification through an integrated Visual Debugger.
- We provide adapter Benchmark Reader Component that can test adapter by randomly making arbitrary data.

Visual Debugger

- We provide functionality that indicates the state of data input as a component at present for test and debugging before distributing the developed adapter. If debug in each component is set to true, a screen is provided to grasp which data flows at the time of test.

Monitoring operation and control

Monitoring system resources/component

- We provide monitoring functionality for CoreCode server resources:
  - Server CPU using quantity/total number of thread in use
  - Memory allocating JVM, memory in use, available memory
- We provide the function to control and monitor the state of server and component working in remote:
  - Controlling and monitoring message queue
  - Controlling and monitoring router and adapter

Controlling the situation of system operation

- We provide remote agent and Admin Console to monitor the state of controlling and operating components such as adapter, router, message queue working in server and remote.
- Controlling the situation of CoreCode operation is provided in a Web-Based form so that it can be monitored from a remote place.
## Manufacturing Message Bus

### Products composition and supporting ADAPTOR

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoreCode Server</td>
<td>Applicable to system that has 2 CPU basically</td>
<td>E/A</td>
<td>Adaptor : no limit</td>
</tr>
<tr>
<td>Enterprise Edition</td>
<td>Dual composition is possible.</td>
<td>E/A</td>
<td>Per CPU</td>
</tr>
<tr>
<td></td>
<td>Additional CPU</td>
<td>CPU</td>
<td></td>
</tr>
<tr>
<td>CoreCode Server</td>
<td>Server is not composed in dual CPU is not added.</td>
<td>E/A</td>
<td>CPU : below 1</td>
</tr>
<tr>
<td>Standard Edition</td>
<td></td>
<td></td>
<td>Memory : below 1G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Adaptor : below 2</td>
</tr>
<tr>
<td>CoreCode Developer Suite</td>
<td>Environment to develop adaptor</td>
<td>Copy</td>
<td>10 Years</td>
</tr>
<tr>
<td>Remoto Agent</td>
<td>Remoto Service</td>
<td>E/A</td>
<td></td>
</tr>
<tr>
<td>Database Adaptor</td>
<td>Oracle, MS-SQL, Sybase, DB2, MySQL</td>
<td>E/A</td>
<td></td>
</tr>
<tr>
<td>Device Adaptor</td>
<td>Mitsubishi, Siemens, GE, LS, Intukifier, Veesa</td>
<td>E/A</td>
<td></td>
</tr>
<tr>
<td>IMS Adaptor</td>
<td>IBM MQ, WebSphereMQ, FioranoMQ, SonicMQ</td>
<td>E/A</td>
<td></td>
</tr>
<tr>
<td>Communication Adaptor</td>
<td>SOAP</td>
<td>E/A</td>
<td></td>
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<tr>
<td>Communication Adaptor</td>
<td>FTP, HTTP(S), Mail, RMI</td>
<td>E/A</td>
<td></td>
</tr>
</tbody>
</table>

## Effect of introduction

### Constructing stable infra and enhancing business competitiveness by introducing CoreCode

- **Constructing infra based on single framework**
  - Constructing base to use diverse equipments and system operation
  - Increasing stability by observing standard and acquiring the ability of expansion
  - Saving cost and increasing productivity in long-term viewpoint

- **Constructing the optimal Interface Hub**

- **Constructing the integrated operation system**
  - Constructing environment for stable system operation
  - Processing based on consistent architecture that can be easily managed
  - Flexible management of environment in which system changes

- **Improving system efficiency**
  - Providing prompt and accurate information
  - Improving job efficiency by efficient information management and connection with other system
  - Ensuring quality and stability by using common component whose performance and stability are verified

- **Securing the RTE base**
  - Stably processing data in high speed and large capacity
  - Improving security and performance
applicable case: constructing integrated system of sewage

- In the integrated system of sewage, Plant-DB data is constructed between each local different model PLC and integrated center system.
- Performance data of Plant equipment is supported in transmission and receipt of data through external equipment such as MES.

Integrated control center

- Integrated MMI
- DCS server
- MMI server
- Web server
- E-mail
- SMS
- LASER PRINTER

 middleware
Server SW(CoreCode Server)

Communication server

- sewage disposal plant1
- sewage disposal plant2
- sewage disposal plant3
- sewage disposal plant4
- sewage disposal plant5