Quick Tour: ORiN 2 for DENSO NetwoRC

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DENSO WAVE Inc.

[Contents]

1 Installation of ORiN2 SDK

1. Run "ORiN2.x.xSDK.exe" on the setup disk, and install "Standard".
2. Start [All programs] -> [ORiN2] -> [CAO] -> [CaoConfig] from the start menu.
3. From Menu bar, select [Help] -> [License].
4. Register your license key. If you don't have a license key, then use the following key. This one is an evaluation license key with a 3-month time limit.[1]

   SKDP-Y1WW-1583-BM1S

For details, please refer"ORiN2¥Doc¥ORiN2SDK user's guide. pdf."

2 Operation test using VBScript

Now we test that only a few lines of code written by notepad can access controller and readout a variable value.

1. Open notepad program and write the following code.
   Change Controller IP address part of "IP=10.8.109.116" according to the actual controller

[1] Some modules are not installed by the evaluation license key. Please refer to "ORiN2 SDK User's Guide" for details.

address.

```
Dim Eng,  Ctl,  Var,  x
Set Eng = CreateObject("CAO.CaoEngine")
Set Ctl = Eng.Workspaces(0).AddController("",  "CaoProv.DENSO.NetwoRC",  "",
"Conn=eth:10.8.109.116")
Set Var = Ctl.AddVariable("I0")
x = CLng(RND*10000)
Var.Value = x
MsgBox "I0=" + CStr(x)
MsgBox "I0=" + CStr(Var.Value)
```

2. After writing the code, save the file with file name and extension, “TestI0.vbs”.
3. After starting the controller, double-click TestI0.vbs and execute it.
4. Please confirm the displayed value is as same as the value of the controller. At this time, a random value x is written on I0 of controller byTestI0.vbs, and the value is displayed.
5. Change controller's I0 to a suitable value, and press OK button of MsgBox.
6. Please confirm the displayed value is as same as the value of the controller.
7. Press OK button of MsgBox is end the program.

3 Operation test using CAO Tester

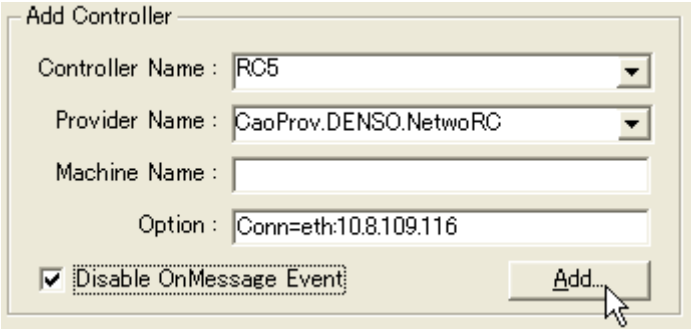
CaoTester is an integrated test tool for CAO interface implementation, and executes various methods of the provider.

3.1. Accessing variables

1. Start ORiN2¥CAO¥Tools¥CaoTester¥Bin¥CaoTester.exe.
2. On [AddController] of “Workspace-$2-??????$" window, input following;

   Controller Name : < any character string (empty acceptable)>
   Example:"RC7"
   Provider Name : CaoProv.DENSO.NetwoRC
   Machine Name : < empty >
   Option : Conn=eth:< Internet Protocol address >
   Example:"Conn=eth:10.8.109.116"

   Then, press [Add…] button.



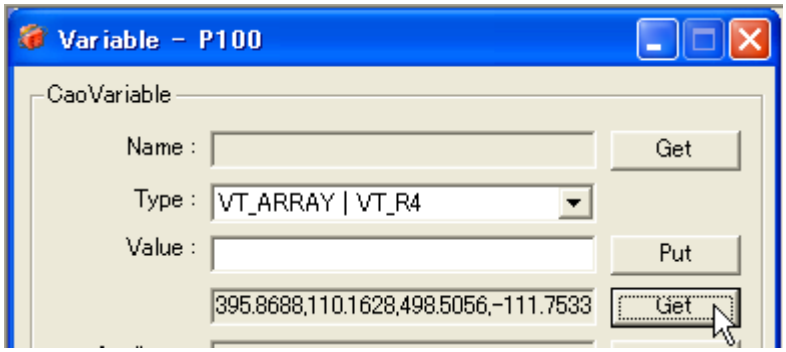
3. At [CaoController] -> [Variable] tab -> [AddVariable] of "Controller-<arbitrary string>" window, input following;

   Name : < variable identifier >< number > Example:"P100", "I0", "J100"

   Option : < empty >

   Then, push the [Add…] button.

4. In "Variable - <variable type><variable number>" window, locate [CaoVariable] -> [Value] and press [Get] button to read out value from controller.
5. In "Variable - <variable type><variable number>" window, locate [CaoVariable] -> [Value], input value and press [Put] button to write value in controller.



3.2. Monitoring and Controlling robot controller task

1. Follow the procedure of Section 3.1 – 1 and 2, and display Controller window.
2. Press [Task tab] -> [TaskNames] -> [Get].
3. Input following into "AddTask"

   Name : < task name > Example:"pro1"

   Option : < empty >

   Press [Add…] button to display "Task-< task name >" window.
4. Press [Start tab] -> [Start] button to start program.
5. Press [Stop tab -> [Stop] button.

6. At the menu [Variable] -> [AddVariable], input following.

   Name : < variable identifier > Example:"@STATUS","@LINE_NO"

   Option : < empty >

   Then press [Add...] button to display “Variable-< variable name >" window.

7. Try [Get] / [Put] of [Value] in the same way as variable.

3.3. Accessing file

1. Follow the procedure of Section 3.1 – 1 and 2, and display Controller window.
2. Press [File tab] -> [FileNames] -> [Get] button.
3. At [AddFile], input following.

   Name : < file name > Example:"pro1.pac"

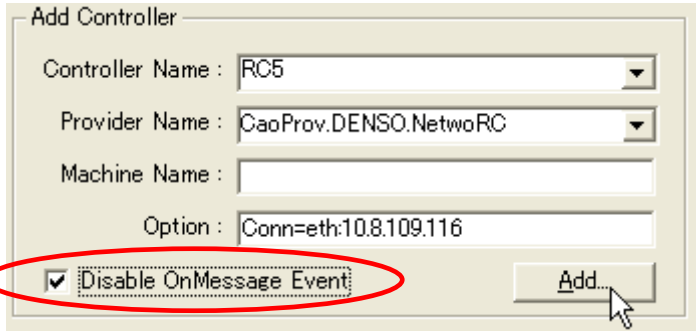
   Option : < empty >

   Then press [Add..] to display "File-<file name >" window.

4. Try [Get] / [Put] of [Value] in the same way as variable.

3.4. Controlling robot

1. Using robot teach pendant, record two or more motion points into robot position variable. In this example, P1 and P2 is assumed to be used to record the positions.
2. Using WINCAPS II, build a executable robot program including following PAC programs.
   (1) ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Bin¥RobSlave.pac
   (2) ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Bin¥UserExtension.pac
   (3) ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Bin¥RobSlave.h
3. Start RobSlave task.
4. Follow the procedure of Section 3.1 – 1 and 2, and display Controller window. However, **please put a check mark on "Disable OnMessage Event"** before pressing [Add Controller] -> [Add…] button.



5. At [Robot] tab -> [AddRobot], input following.

   Name : < robot name (arbitrary character string)> Example:"VSE"

   Option : < empty >

   Then press [Add..] to display "Robot -<robot name >" window.

6. At [Move tab], input following.
   Interpolation : 1:PTP
   Pose : P1
   Option : < empty >
   Then, press [Move] button to move robot.

For other functions, lease refer to the following documents.
ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Sample¥Robot sample
ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Doc¥NetwoRC provider guide. pdf
ORiN2¥CAO¥Tools¥CaoTester¥Doc¥CaoTester.pdf

4 Operation test using CAO script

ORiN2 SDK provides a tool called CaoScript, which enables simple robot motion test without formal program development environment like Microsoft Visual Basic. Now we will try pick and place motion of a robot using this tool.

1. Start ORiN2¥CAO¥Tools¥CaoScript¥Bin¥CaoScript.exe.
2. Start RobSlave task, which is used in section 3.4.
3. Using [File]-[Open…] menu, open ORiN2¥CAO¥Tools¥CaoScript¥Sample¥PickAndPlace.vbs
4. Change the IP address portion of the program, “IP=10.8.109.116”, according to the actual controller address.
5. At the text box of tool bar, input “Pro1", and execute [Run] menu -> [Start]."Start".

For details of CaoScript, please refer [How to use tools] -> [CaoScript] section of the following file.
ORiN2¥CAO¥Engine¥Doc¥ORiN2 programming guide. pdf

5 Visual Basic samples in ORiN2 SDK

Some Visual Basic sample programs for DENSO NetwoRC provider are stored in the following directory for reference.
ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Sample

Table1Sample program list

Sample name	Division	Content
Variable	CaoVariable	Read/Write controller's variable, I/O and CNF.
File	CaoFile	Read/Write file in a controller.
Tree	CaoFile	Display folder list and get file in a controller.
Log	CaoFile	Get controller's error log and operation log.
Task	CaoTask	Information display and operation (start and stop) of controller's task.
Robot	CaoRobot	Execute robot motion command, get robot current position, and call user extension command. RobSlave.pac, UserExtension.pac, and RobSlave.h f stored at ORiN2¥CAO¥ProviderLib¥DENSO¥NetwoRC¥Bin¥ are necessary.
Execute	CaoCotroller	Execution of CaoCotroller::Execute.
Trans	CaoController CaoVariable CaoFile	Backup and restore Controller's all data.
Rom	CaoController CaoFile	Read/Write ROM image of controller.

6 Introduction to CaoSQL

CaoSQL is a data management middleware. The software collects data from two or more FA equipment, and offers the collected data to the client application of CaoSQL (for instance, operation management and production instruction software, etc.).

Please refer to the following documents for details.
ORiN2¥CaoSQL¥Doc¥CaoSQL user's guide. pdf
ORiN2¥CaoSQL¥Doc¥CaoSQL Tools user's guide. pdf

Following example is to display robot variable graph using CaoSQL DDL server function, without programming.

1. Start ORiN2¥CaoSQL¥Bin¥CaoSQLConfig.exe.
2. Locate [Action] -> [Settings…] -> [API], put check mark on “DDE Server”[2], and press [OK] button.
3. Select [Edit] menu -> [Add Controller], and input “RC7”. (Quotation mark “” is not necessary.

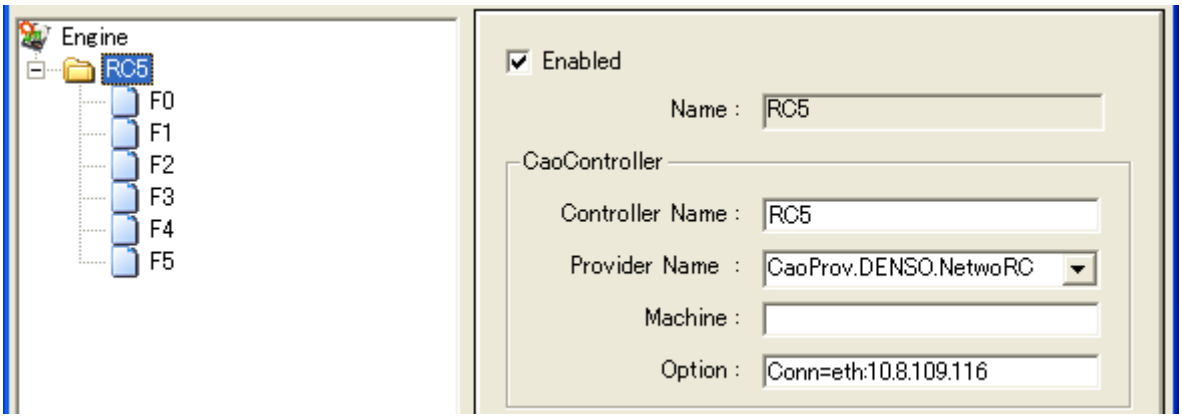
[2] Refer to ORiN2¥CaoSQL¥Doc¥CaoSQL User’s Guide.pdf for details on DDE server.

Input only RC7)

4. To the added Controller, input following.

   Controller Name : RC7
   Provider Name : CaoProv.DENSO.NetwoRC
   Machine Name : < empty >
   Option : Conn=eth:< Internet Protocol address >
   Example:"Conn=eth:10.8.109.116"

5. Select [Edit] menu -> [Add Item] and input “F0”.
6. Repeat step 5 and add “F1” – “F5”



7. Execute [File] menu -> [Save] command.
8. Select the added item "F0", and execute [Edit] menu -> [Copy DDE string].
9. Start ORiN2¥CaoSQL¥Bin¥CaoSQLLauncher.exe, and press [Start] button.
10. Start Excel, and do [Paste] to cell of Excel.
11. Repeat similar operation of steps 9 and 10, and add F1 to F5 to the excel worksheet.
12. Draw an Excel graph using the cells for F0-F5.
13. Change the value of robot variables F0-F5 using teach pendant, and confirm that the Excel graph is updated.