

CA IDMS 19.0 Web Services for Modernization

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CA Technologies



CA IDMS™ Technical Conference

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Abstract

- The vision of CA IDMS 19.0 is to improve CA IDMS modernization capabilities through features that enable customers to expand investments in core CA IDMS applications and improve developer productivity using modern skills and industry-standard technology.
- This session discusses a CA IDMS 19.0 project to simplify integration of CA IDMS applications and Web services.

Agenda

THE WEB SERVICES REQUIREMENT

CA IDMS™ WEB SERVICES DEMONSTRATION

CA IDMS™ APPLICATION AS A WEB SERVICES REQUESTER

CA IDMS™ APPLICATION AS A WEB SERVICES PROVIDER

SUMMARY

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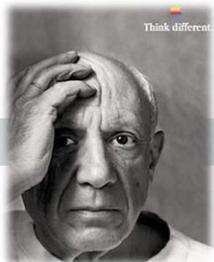


The Web Services requirement

Application Development in a Mainframe World

Application development *for* the mainframe

Declining



Application development **leveraging** the mainframe

New and Growing

Mainframe app dev:

- Enterprises differentiate themselves by providing services closer to the customer via **mobile and web apps**

Utilizing the **mainframe** as the *System of Record* at the heart of the Dynamic Data Center

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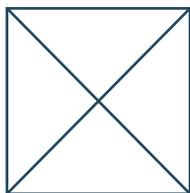


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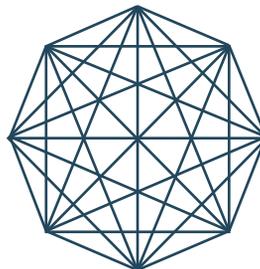
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Integrations Increase Complexity and Reduce Flexibility



4 Nodes
6 Connections



8 Nodes
28 Connections

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Web Services

Services that:

- Support business processes
- Are reusable
- Can be loosely coupled for interoperability
- Can be combined to build applications



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Web Services In Action

- Provide location information
- Request shipment status
- Ask for a quote
- Approve payment
- Change miles to kilometers
- Convert currency



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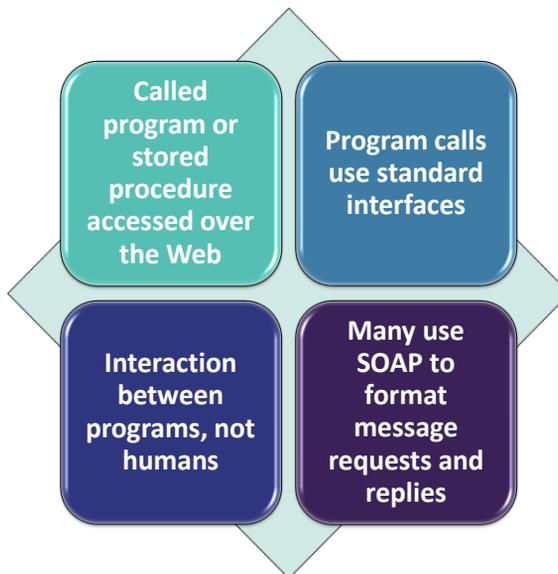


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Web Services overview



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Web Services participants

- The calling program
 - Requester
 - Consumer
 - Sometimes called outbound Web services
- The responding program
 - Provider
 - Producer
 - Sometimes called inbound Web services



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Web Services Technology



- SOAP
 - Simple Object Access Protocol for message format
 - XML-based
 - May include a WSDL contract describing interface
- RESTful
 - Representational State Transfer
 - Lighter weight, service provider and consumer know the interface
 - Good for internal, loosely coupled and mobile services
 - May be stateless
- Transport via HTTP or JMS
 - SOAP over HTTP – better for external Web services, not guaranteed
 - SOAP over JMS – better for internal use, guaranteed response
- JSON emerging as alternative to XML

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Why Web Services for CA IDMS?

- Better CA IDMS application integration in application economy
- Highly requested by customers and on IUA Communities Ideation

← → ↻ 🏠 <https://communities.ca.com/ideas/103000429>

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Products Services Support REWRITE Communities Partners

Home Content People Communities Help - Log

More ideas in **CA IDMS IUA EIU A**

💡 **As a next-gen application developer, I need to invoke a web service from an on-line application**

Created on Aug 7, 2013 4:42 AM by GregB - Last Modified: Nov 25, 2014 10:02 AM

8 Voted on 8 times. You have not voted. **CURRENTLY PLANNED**

This idea proposes capabilities for IDMS applications to call (consume) a Web service from ADS, IDMS COBOL or PL/I application programs.

Customers build inbound Web services access to IDMS data currently using IDMS SQL and IDMS Server's ODBC and JDBC support, solutions using TCP/IP socket programming or third-party tools. Outbound Web services can only be done using TCP/IP socket programming or third-party tools. A number of customers have requested better options for ADS and IDMS programs to directly call/invoke/consume standard Web services.

CA is interested in feedback on which languages are most important to support (ADS, COBOL, PL/I) and which Web services API standards are most used - SOAP or RESTful.

Categories: Application Developer Tags: [app_modernization-web_srvs](#)

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Web Services in the CA IDMS world

Web service can be a CA IDMS/DC program

Will be delivered in CA IDMS 19.0 incremental releases

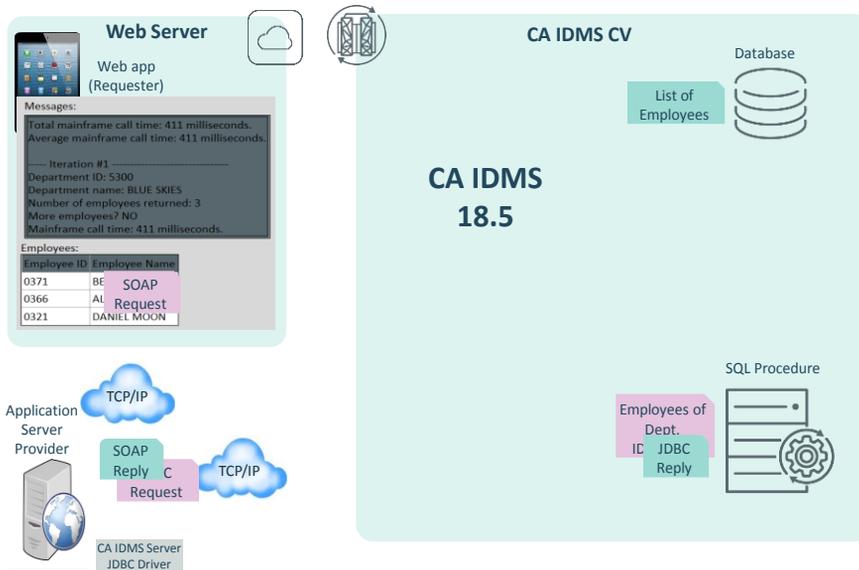
Based on SOAP, XML, TCP/IP

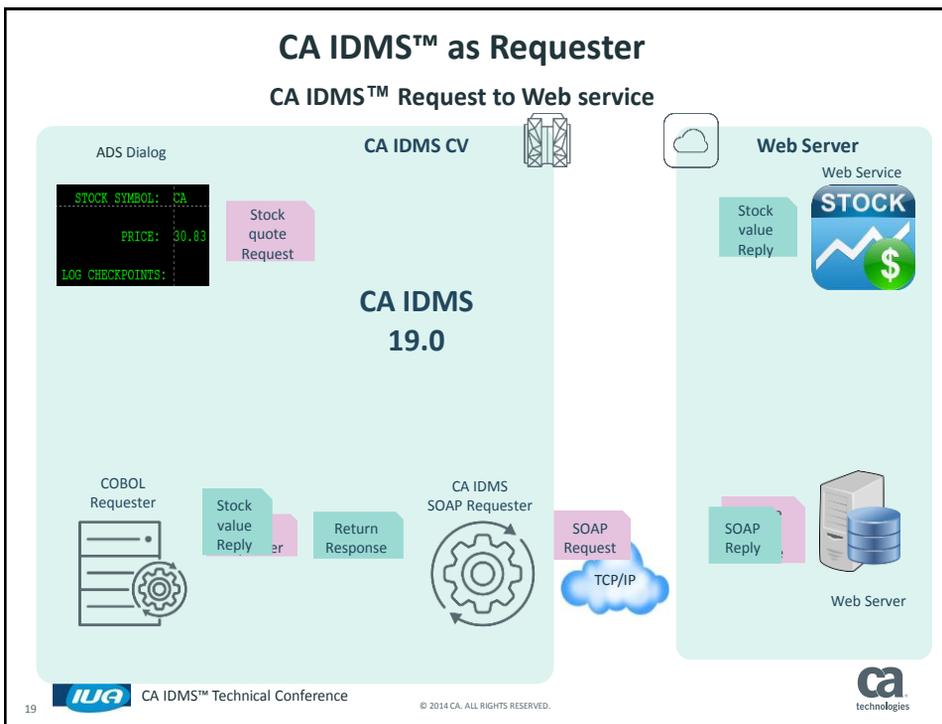
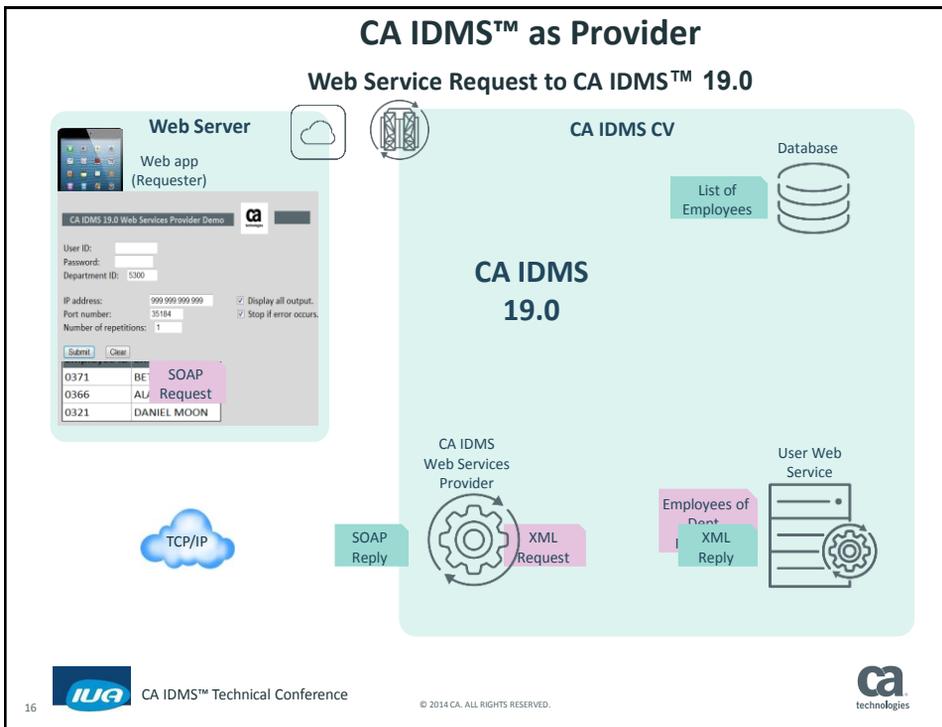
Extensible to other WS technologies in the future

Closely tied to CA IDMS SQL, CA IDMS Server

CA IDMS™ as DB Server

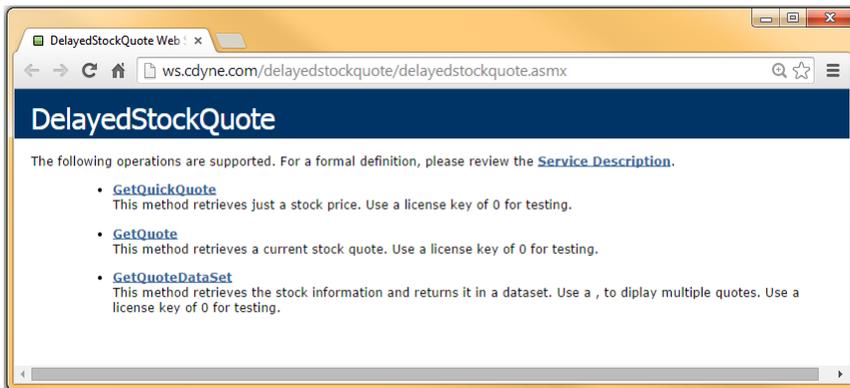
JDBC Request to CA IDMS™ 18.5





CA IDMS™ Web services demonstration

Requester Demo Web Service being called

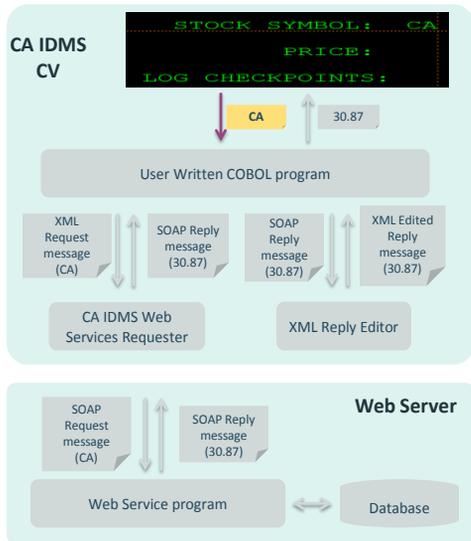




CA IDMS™ application as a web services requester

CA IDMS™ as Requester

Sending Request to WS



ADS Dialog:

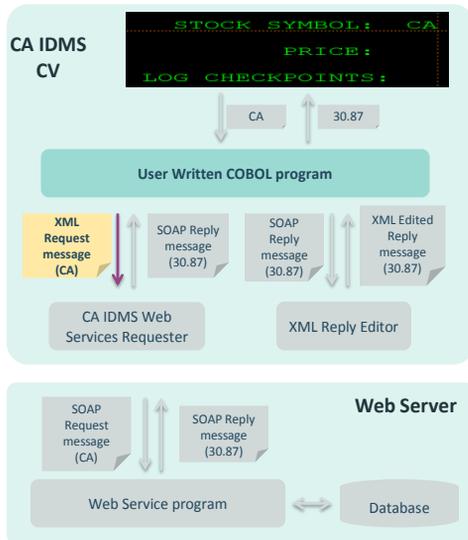
Prepare input for COBOL program:

```
MOVE MAP-STOCK-SYMBOL TO W0795TOC-STOCK-SYMBOL.
MOVE ' ' TO W0795TOC-QUOTE-RESULT.
MOVE MAP-LOG-CHECKPOINTS TO W0795TOC-LOG-CHECKPOINTS.
MOVE ' ' TO W0795TOC-LOG-ERRORS.
MOVE 0 TO W0795TOC-ERROR-INFO-LENGTH.
MOVE ' ' TO W0795TOC-ERROR-INFO.
```

Link to user-written COBOL program to format SOAP request message.

CA IDMS™ as Requester

Sending Request to WS



User Written COBOL Program:

User written COBOL program Sample sources are provided

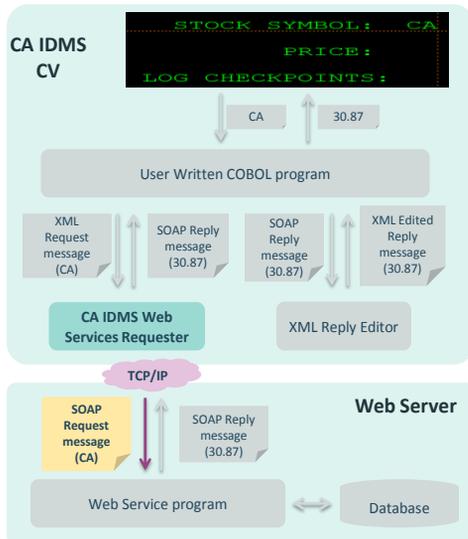
Create the XML request message:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <GetQuickQuote xmlns="http://ws.cdyne.com/">
      <StockSymbol>CA</StockSymbol>
      <LicenseKey>0</LicenseKey>
    </GetQuickQuote>
  </soap:Body>
</soap:Envelope>
```

Send the XML request message to the CA IDMS Web Services Requester

CA IDMS™ as Requester

Sending Request to WS



CA IDMS Web Services Requester (SOAP Requester):

Open a TCP/IP socket using CA IDMS Callable Services (IDMSOCKI)

Connect to the host web server

Format the XML request message, adding HTTP headers:

```
POST /delayedstockquote/delayedstockquote.asmx
HTTP/1.1 Host: ws.cdyne.com Content-Type: text/xml;
charset=utf-8 Content-Length: length
SOAPAction: "http://ws.cdyne.com/GetQuickQuote"
```

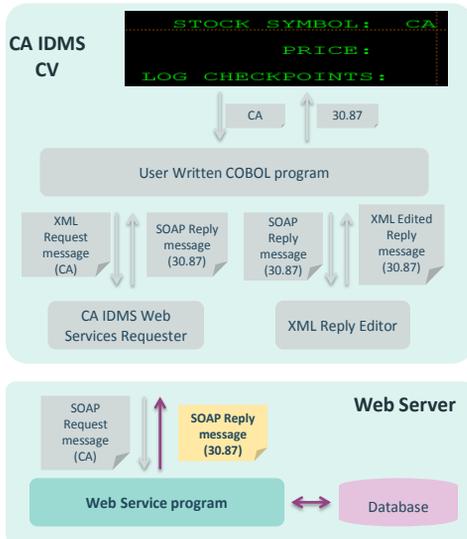
```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <GetQuickQuote xmlns="http://ws.cdyne.com/">
      <StockSymbol>CA</StockSymbol>
      <LicenseKey>0</LicenseKey>
    </GetQuickQuote>
  </soap:Body>
</soap:Envelope>
```

Convert the message from EBCDIC to ASCII (IDMSIN01)

Send the SOAP request message to host

CA IDMS™ as Requester

Processing the Request



Web Service Program:

Receive the SOAP request message

Parse the XML request message to extract requested parameters:

```
POST /delayedstockquote/delayedstockquote.asmx
HTTP/1.1 Host: ws.cdyne.com Content-Type: text/xml;
charset=utf-8 Content-Length: length
SOAPAction: "http://ws.cdyne.com/GetQuickQuote"
...
<GetQuickQuote xmlns="http://ws.cdyne.com/">
  <StockSymbol>CA</StockSymbol>
  <LicenseKey>></LicenseKey>
</GetQuickQuote>
...
```

Determine which user-written program to call and action to perform on the database, based on:

```
Host: ws.cdyne.com
SOAP Service: /delayedstockquote/delayedstockquote.asmx
SOAP Action (method): http://ws.cdyne.com/GetQuickQuote
Stock Symbol requested: CA
```

Send reply message to SOAP Requester:

```
HTTP/1.1 200 OK Content-Type: text/xml; charset=utf-8
Content-Length: length
...
<GetQuickQuoteResponse xmlns="http://ws.cdyne.com/">
  <GetQuickQuoteResult>30.87</GetQuickQuoteResult>
</GetQuickQuoteResponse>
...
```

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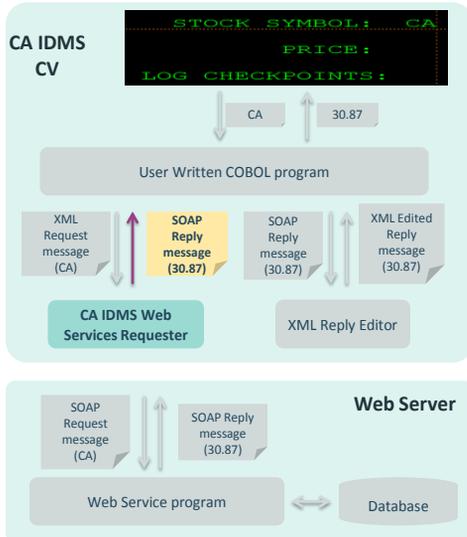
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CA IDMS™ as Requester

Receiving Reply from WS



CA IDMS Web Services Requester (SOAP Requester):

Receive the SOAP reply message

Reassemble the SOAP reply message:

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Content-Length: length
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns: xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns: xsd="http://www.w3.org/2001/XMLSchema"
xmlns: soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <GetQuickQuoteResponse xmlns="http://ws.cdyne.com/">
      <GetQuickQuoteResult>30.87</GetQuickQuoteResult>
    </GetQuickQuoteResponse>
  </soap:Body>
</soap:Envelope>
```

Convert the message from ASCII to EBCDIC (IDMSIN01)

Close the TCP/IP socket

Return message to calling program

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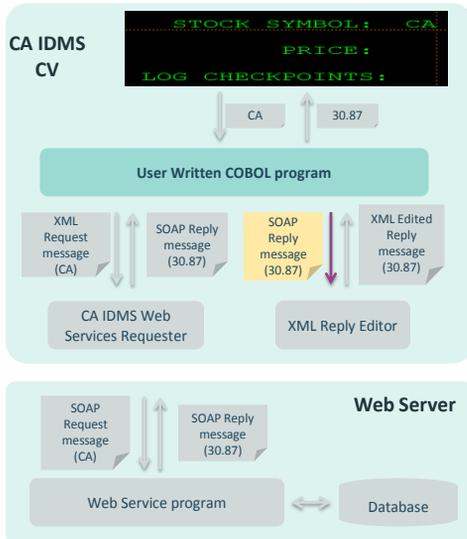
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CA IDMS™ as Requester

Receiving Reply from WS

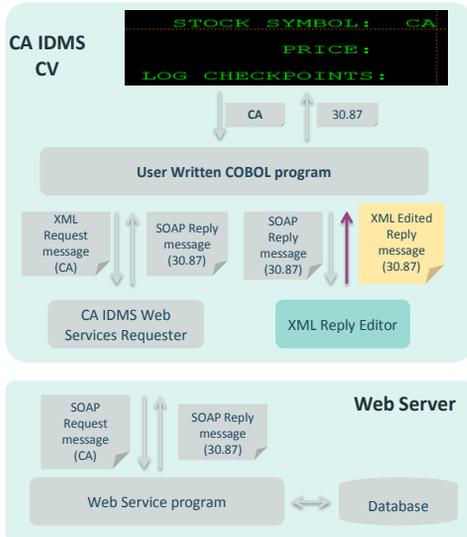


User Written COBOL Program:

Sends SOAP reply message to XML Reply Editor

CA IDMS™ as Requester

Receiving Reply from WS



XML Editor:

Receive the SOAP reply message

Edit the SOAP reply message as requested:

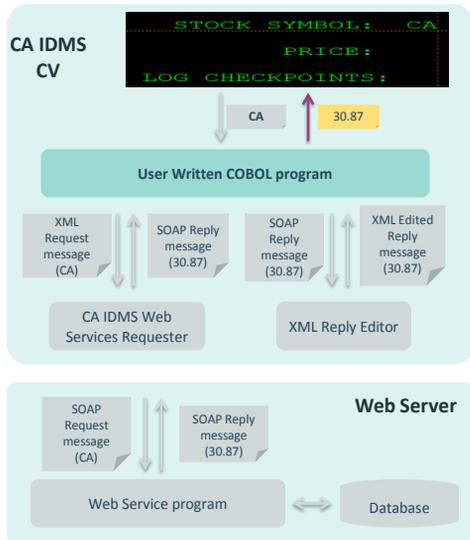
1. Check for HTTP status → 200 OK ?
2. Checks for "Content-Type: text/xml"
3. Check for SOAP fault string
4. Remove HTTP headers

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset=utf-8
Content-Length: length
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <GetQuickQuoteResponse xmlns="http://ws.cdyne.com/">
      <GetQuickQuoteResult>30.87</GetQuickQuoteResult>
    </GetQuickQuoteResponse>
  </soap:Body>
</soap:Envelope>
```

Send XML reply edited message to the caller

CA IDMS™ as Requester

Receiving Reply from WS



User Written COBOL Program:

Receive XML reply edited message

Parse XML edited message to get WS data (stock price):

```
XML - CONTENT - CHARACTERS .
EVALUATE FUNCTION UPPER-CASE(CWA1-EDITED-ELEMENT)
WHEN 'GETQUICKQUOTERESULT'
    MOVE XML-TEXT TO WS-QUOTE-RESULT
    MOVE 'YES' TO WAS-RESULT-FOUND
END - EVALUATE .
```

Output example:

```
XML - EVENT          ----- XML-TEXT
START-OF-ELEMENT    ----- GetQuickQuoteResult
CONTENT-CHARACTERS  ----- 30.87
END-OF-ELEMENT      ----- GetQuickQuoteResult
```

Send WS data (stock price + error info) to the ADS dialog

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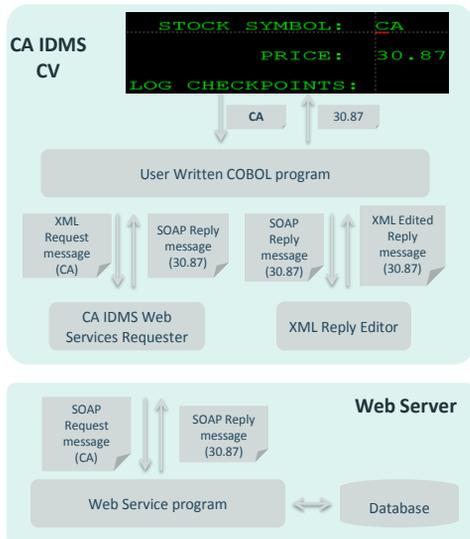
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CA IDMS™ as Requester

Receiving Reply from WS



ADS Dialog:

Receive output from COBOL program:

```
MOVE W079STOC-QUOTE-RESULT TO MAP-QUOTE-RESULT .
MOVE W079STOC-ERROR-INFO TO MAP-ERROR-INFO .

IF W079STOC-ERROR-INFO-LENGTH GT 0
DO
    DISPLAY MSG TEXT MAP-ERROR-INFO .
END .
ELSE
DO
    DISPLAY MSG TEXT
        'ENTER ANOTHER STOCK SYMBOL AND PRESS <ENTER> . ' .
END .

MSEND
.
```

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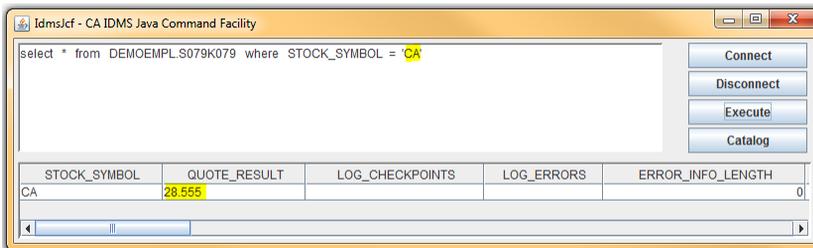
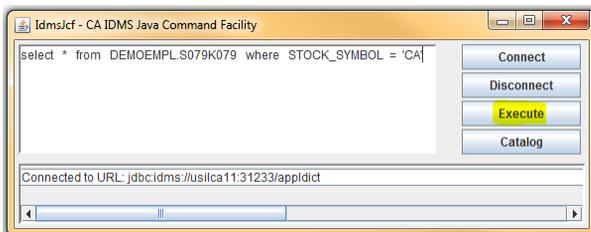


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SQL Procedure calling Web Service in CA IDMS™ Server



Web Services Logging Demo



CA IDMS™ application as a web services provider

Provider Demo Web Service being Called

Web application as the Web Service Requester

The screenshot shows a web application interface for the CA IDMS 19.0 Web Services Provider Demo. At the top, there is a header bar with the text "CA IDMS 19.0 Web Services Provider Demo" and the CA Technologies logo on the right. Below the header, there are several input fields and checkboxes. The "User ID:" field is empty. The "Password:" field is empty. The "Department ID:" field contains the value "5300". The "IP address:" field contains "999.999.999.999". The "Port number:" field contains "35184". The "Number of repetitions:" field contains "1". There are two checkboxes: "Display all output." which is checked, and "Stop if error occurs." which is also checked. At the bottom of the form, there are two buttons: "Submit" and "Clear".

Provider Demo Web Service being Called

Response from the Web Service Program which Reads the Employee Demo Database

Messages:

```
Total mainframe call time: 411 milliseconds.
Average mainframe call time: 411 milliseconds.

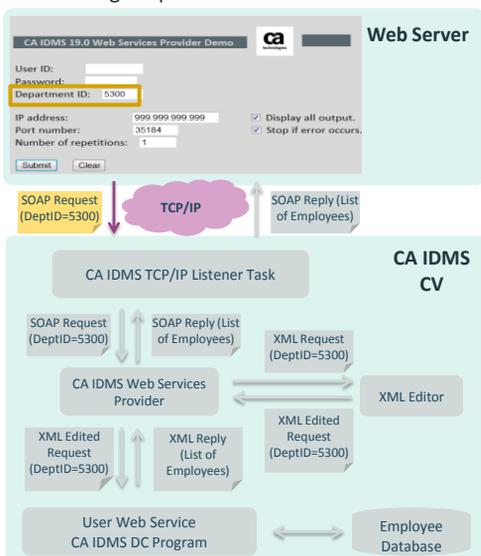
----- Iteration #1 -----
Department ID: 5300
Department name: BLUE SKIES
Number of employees returned: 3
More employees? NO
Mainframe call time: 411 milliseconds.
```

Employees:

Employee ID	Employee Name
0371	BETH CLOUD
0366	ALAN DONOVAN
0321	DANIEL MOON

CA IDMS™ as Provider

Sending Request to WS



Web Application (Requester Program):

Create a SOAP request message:

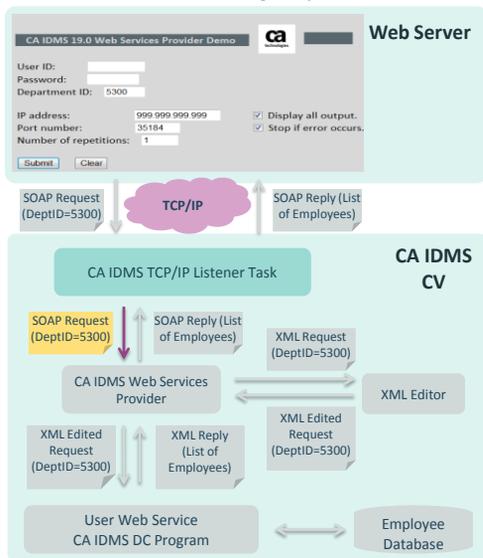
```
POST /S079K215 HTTP/1.1. User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; MS Web Services Client Protocol 4.0.30319.17929)
Content-Type: text/xml; charset=utf-8
SOAPAction: ""
Host: 141.202.65.11:35184
Content-Length: ...

<?xml version="1.0" encoding="utf-8"?>
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
<soapenv:Body>
<tns:S079K215Operation
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:tns="http://www.S079K215.Request.com">
<tns:CVSignon>
<tns:CVUserID>
<tns:CVPassword>
</tns:CVSignon>
<tns:InputFields>
<tns:DeptID>5300</tns:DeptID>
<tns:DBName>
</tns:InputFields>
</tns:S079K215Operation>
</soapenv:Body>
</soapenv:Envelope>
```

Send the SOAP request via the Internet to CA IDMS on the mainframe

CA IDMS™ as Provider

Listener Task – Sending Request to WS



CA IDMS TCP/IP Listener Task:

Creates a stream socket on the port, optionally on a specific TCP/IP stack

Accept and listen the connection request, acquires a PTERM/LTERM pair and attaches the server task on it

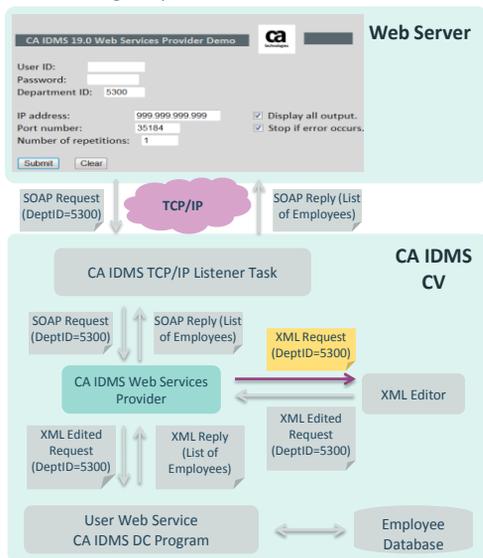
Receive the SOAP Request message

Call the CA IDMS Web Services Provider and pass the SOAP Request:

```
DIS TASK LIST9999
ENABLED
EXTERNAL WAIT IS 90
INTERNAL
INACTIVE INTERVAL IS 30
INVOKES PROGRAM S079K212
NOINPUT
...
```

CA IDMS™ as Provider

Sending Request to WS



CA IDMS Web Services Provider Server (SOAP Server):

Extract the XML Request from SOAP message

```
POST /S079K215 HTTP/1.1. User-Agent: Mozilla/4.0 (comp
atible; MSIE 6.0; MS Web Services Client Protocol 4.0.
30319.17929) .Content-Type: text/xml; charset=utf-8.
SOAPAction: ".Host: 141.202.65.11:35184..Content-Leng
...
<?xml version="1.0" encoding="utf-8">
<soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body><S079K215Operation
xmlns="http://www.S079K215.Request.com">
<CVSignon>
<CVUserID> </CVUserID>
<CVPassword/>
</CVSignon>
<InputFields>
<DeptID>5300</DeptID>
</InputFields>
</S079K215Operation></soap:Body>
</soap:Envelope>
```

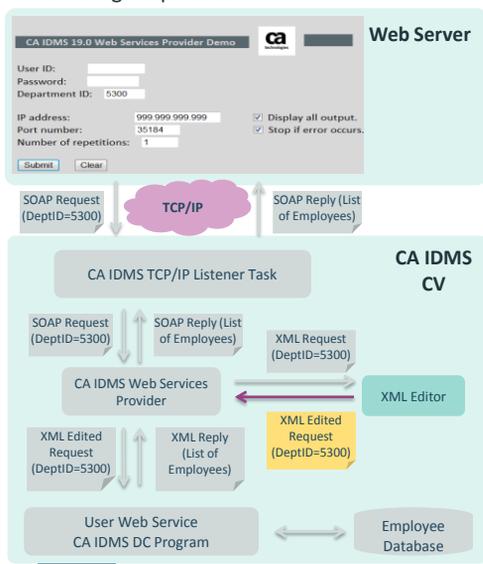
Determine which User Web Service to call:

```
POST /S079K215
```

Link to XML Editor program to format the message.
Passes XML Request message as input.

CA IDMS™ as Provider

Sending Request to WS



XML Editor:

Receive the XML Request message

Edit the XML request message as requested (Levels 1 to 7):

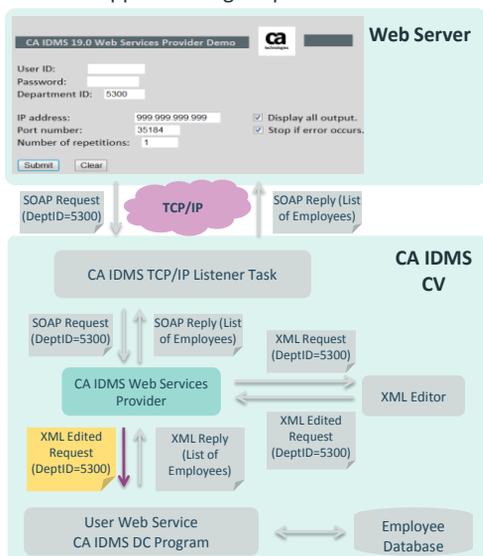
1. Checks for "Content-Type: text/xml"
2. Extract XML content only
3. Remove CRLF's.

```
POST /S079K215-HTTP/1.1...User-Agent: Mozilla/4.0 (comp
atible; MSIE 6.0; MS-Web-Services-Client-Protocol 4.0-
30319-17929)...Content-Type: text/xml; charset=utf-8...
SOAPAction: "...Host: 999.999.999.35184...Content-Leng
...
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<S079K215Operation
xmlns="http://www.S079K215.Request.com">
<CV5Signon>
<CVUserID> </CVUserID>
<CVPassword/>
</CV5Signon>
<InputFields>
<DeptID>5300</DeptID>
</InputFields>
</S079K215Operation>
</soap:Body>
</soap:Envelope>
```

Return the XML Edited Request message to caller

CA IDMS™ as Provider

Web App – Sending Request to WS



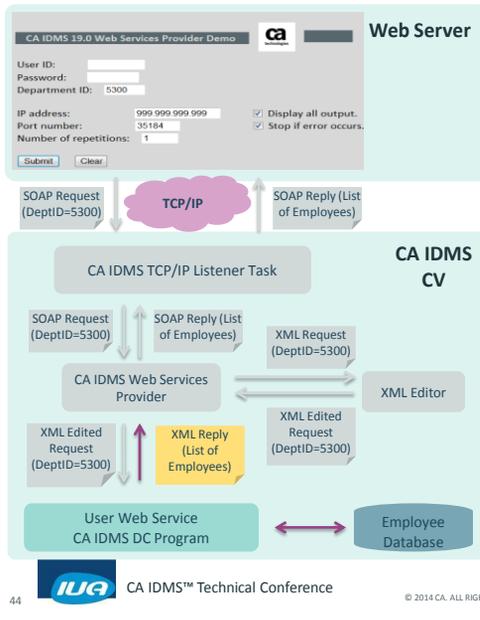
CA IDMS Web Services Provider Sever (SOAP Server):

Receive the XML edited message

Send the XML Request message to the User Web Service

CA IDMS™ as Provider

Web App – Sending Request to WS



User Web Service (provider program):

Receive the XML Request message

Parse the XML message to extract requested elements:

```
01 OutputFields.
05 DeptID PIC X(04) VALUE SPACES.
05 DeptName PIC X(45) VALUE SPACES. ...
10 EmpID PIC X(04) VALUE SPACES.
10 EmpFirstName PIC X(10) VALUE SPACES.
10 EmpLastName PIC X(15) VALUE SPACES.
...
START ELEMENT TAG: DeptID
MOVE XML-TEXT TO WS-DEPT-ID.
} Element of interest
```

Read the database to get the requested data:

```
MOVE WS-DEPT-ID-NUMERIC TO DEPT-ID-0410
PERFORM 7020-OBTAIN-CALC-DEPARTMENT.
```

Format XML Reply message:

```
<S079K2150perationResponse
<OutputFields>
<DeptID>S300</DeptID>
<DeptName>BLUE SKIES</DeptName>
<NumEmployees> 3</NumEmployees>
<EmployeeInfo>
<EmpID>0371</EmpID>
<EmpFirstName>BETH</EmpFirstName>
<EmpLastName>CLOUD</EmpLastName>
</EmployeeInfo>
</OutputFields>
...
</S079K2150perationResponse >
```

Return the XML Reply message to the caller

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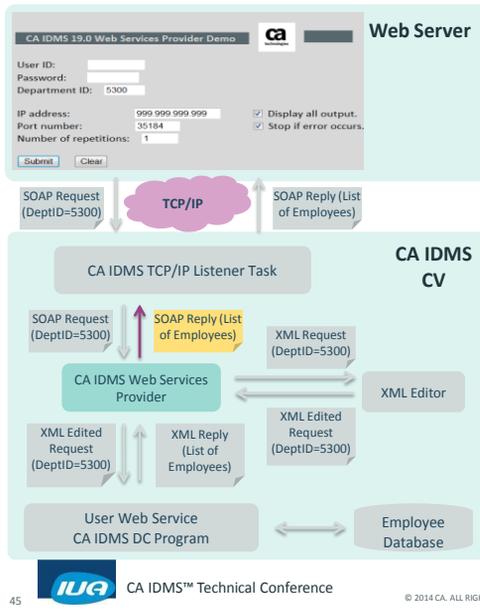
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CA IDMS™ as Provider

Web App – Sending Request to WS



CA IDMS Web Services Provider Server (SOAP Server):

Receive the XML Reply message

Package the Reply message as a SOAP reply

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:wsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<S079K2150perationResponse
xmlns="http://www.S079K215.Response.com">
<OutputFields>
<DeptID>S300</DeptID>
<DeptName>BLUE SKIES</DeptName>
<NumEmployees> 3</NumEmployees>
<EmployeeInfo>
<EmpID>0371</EmpID>
<EmpFirstName>BETH</EmpFirstName>
<EmpLastName>CLOUD</EmpLastName>
</EmployeeInfo>
</OutputFields>
...
</S079K2150perationResponse >
</soap:Body>
</soap:Envelope>
```

Send the SOAP Reply message to the Requester

45



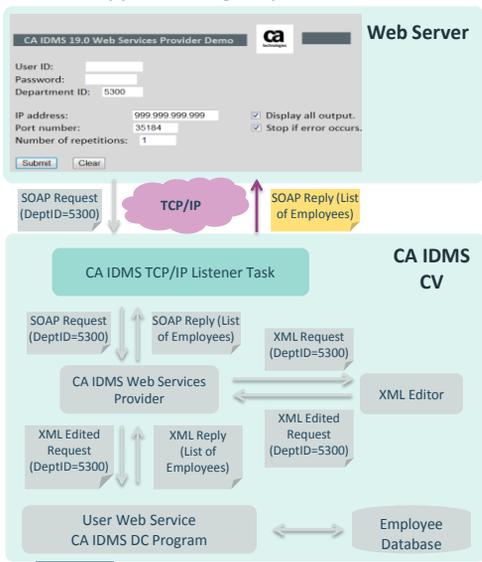
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CA IDMS™ as Provider

Web App – Sending Request to WS



CA IDMS TCP/IP Listener Task:

- Receive the SOAP Reply message
- Keep listening until service is stopped
- Send the SOAP Reply message to the Requester

46



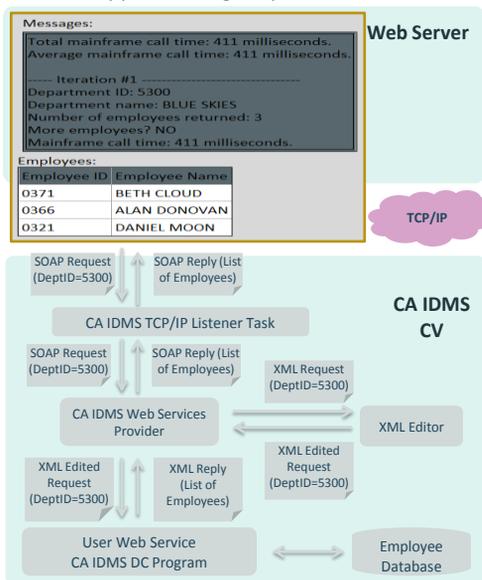
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CA IDMS™ as Provider

Web App – Sending Request to WS



Web Application (requester program):

- Receive the SOAP Reply message
- Display the retrieved data

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Summary

Summary

CA IDMS Web Services Value in the App Economy

- Powerful framework
 - Standards-based
 - Enables existing applications to work with each other
 - Provides basis for new apps that leverage CA IDMS assets
- CA IDMS participation
 - Economical
 - Take advantage of existing resources and modern skills
 - Deliver new value to your organization



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Questions and Answers