

# 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

3



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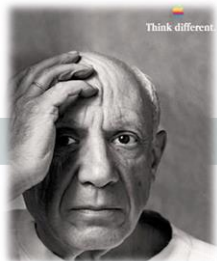


## The Web Services requirement

## 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

5

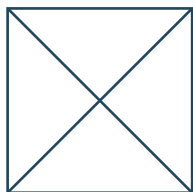


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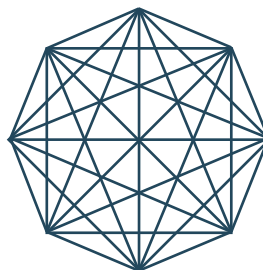
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## Integrations Increase Complexity and Reduce Flexibility



4 Nodes  
6 Connections



8 Nodes  
28 Connections

6



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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

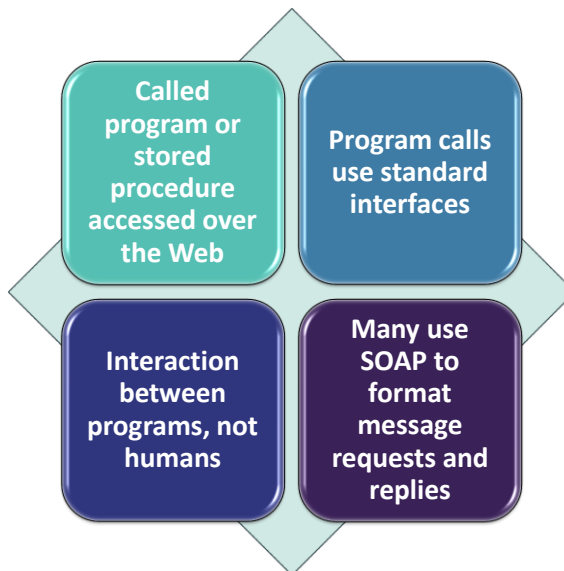


## Web Services In Action

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



## Web Services overview



## Web Services participants

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



## 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

11



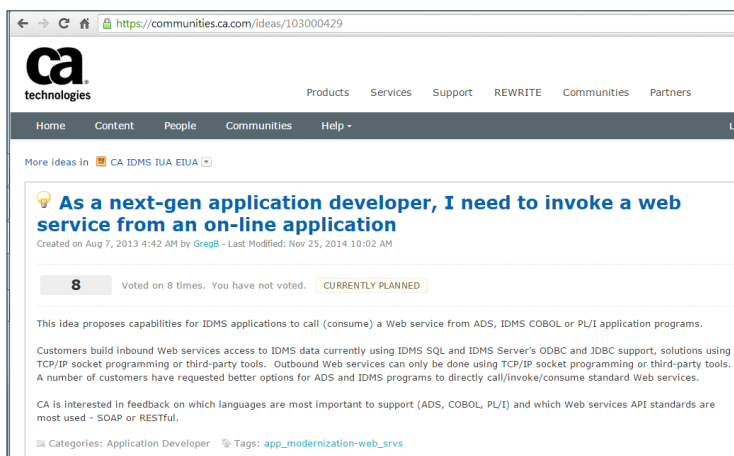
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## Why Web Services for CA IDMS?

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



12



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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

13



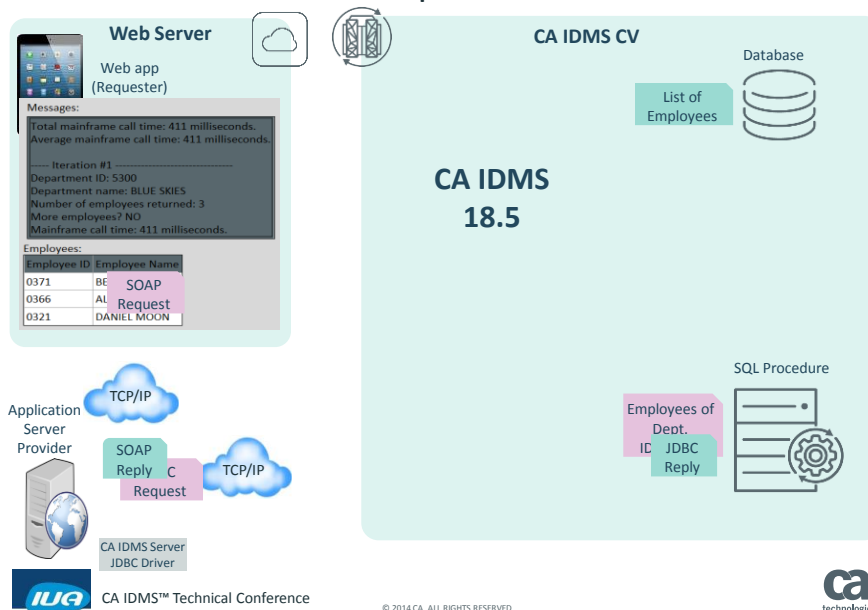
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## CA IDMS™ as DB Server

### JDBC Request to CA IDMS™ 18.5



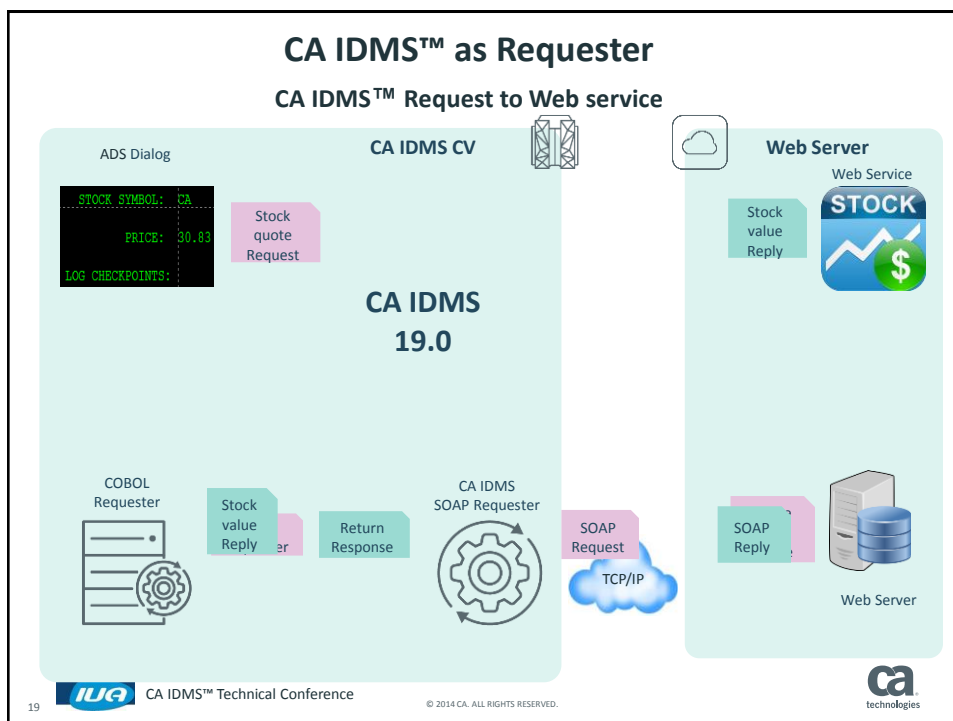
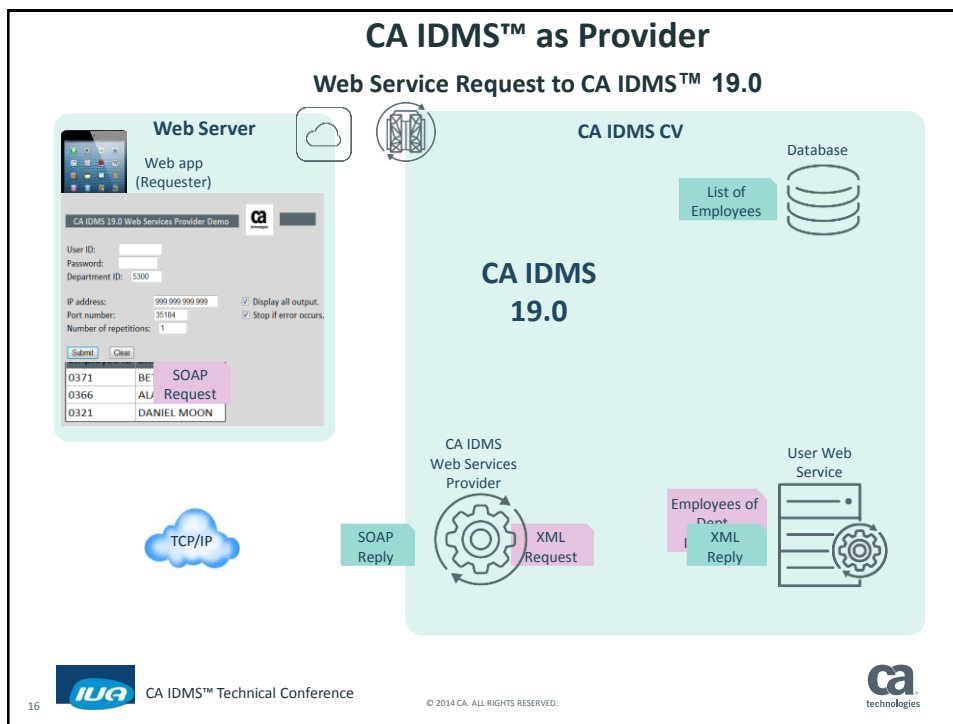
14



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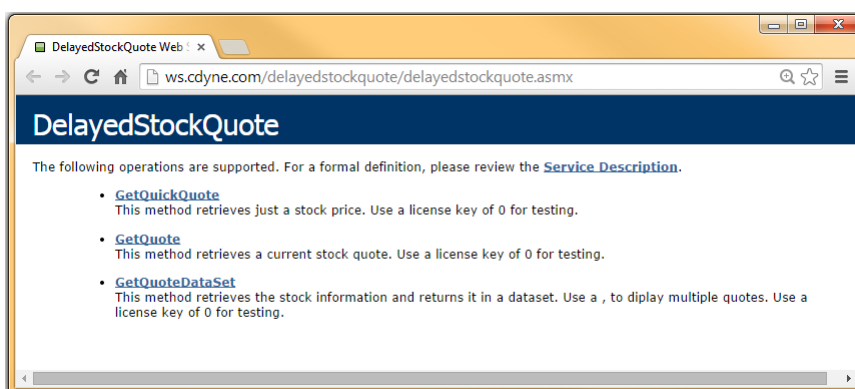






## CA IDMS™ Web services demonstration

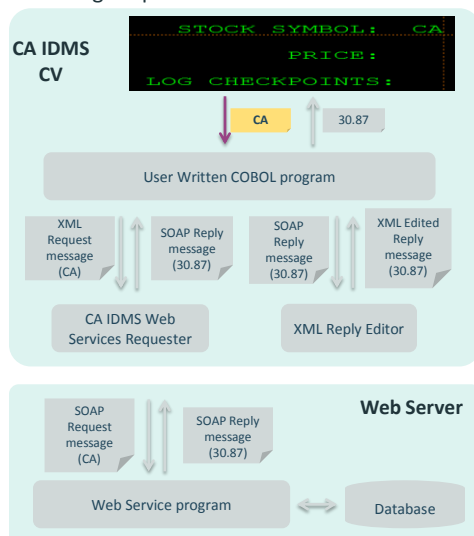
### Requester Demo Web Service being called



## CA IDMS™ application as a web services requester

### CA IDMS™ as Requester

Sending Request to WS



ADS Dialog:

Prepare input for COBOL program:

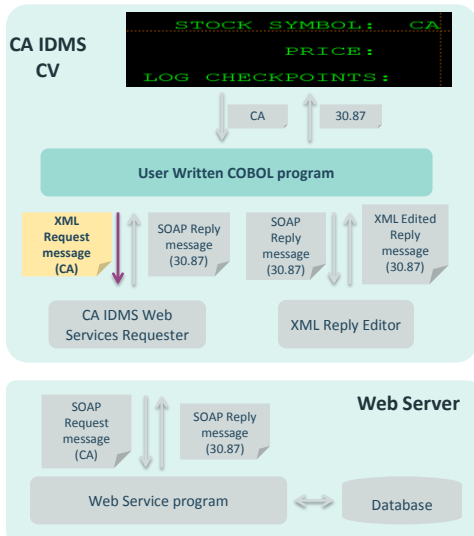
```

MOVE MAP-STOCK-SYMBOL TO W079STOC-STOCK-SYMBOL.
MOVE ' ' TO W079STOC-QUOTE-RESULT.
MOVE MAP-LOG-CHECKPOINTS TO W079STOC-LOG-CHECKPOINTS.
MOVE ' ' TO W079STOC-LOG-ERRORS.
MOVE 0 TO W079STOC-ERROR-INFO-LENGTH.
MOVE ' ' TO W079STOC-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

25



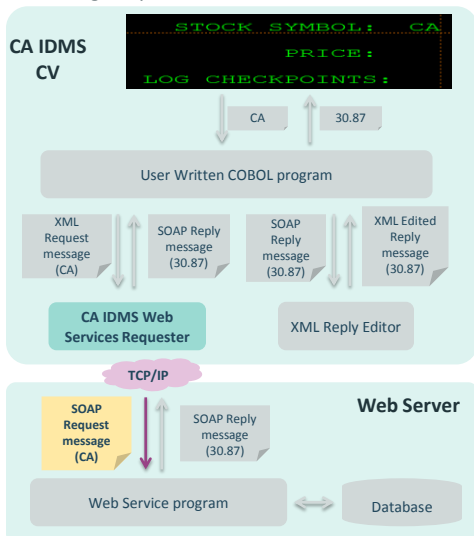
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## CA IDMS™ as Requester

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

26



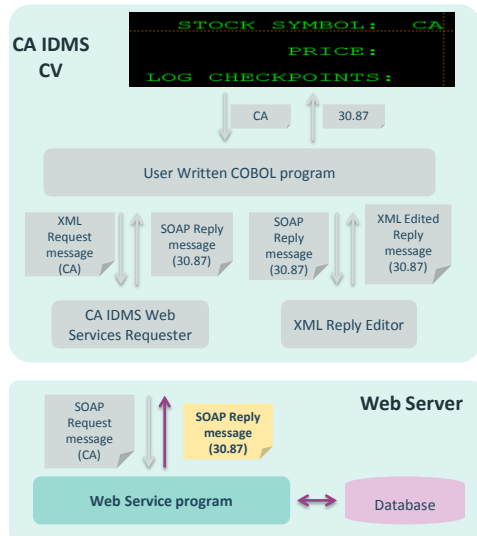
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## CA IDMS™ as Requester

### 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>0</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>
...
```

27



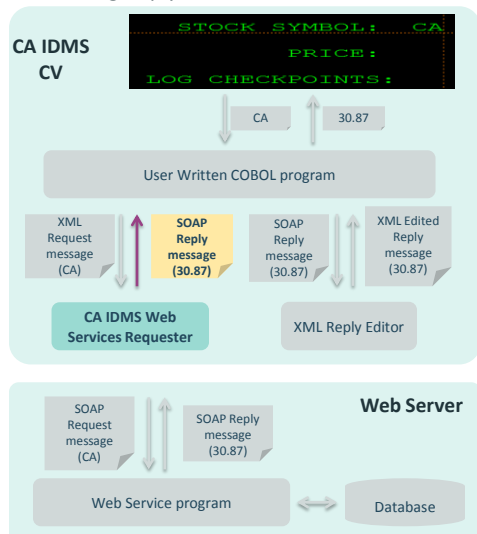
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## CA IDMS™ as Requester

### 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:xs="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

28



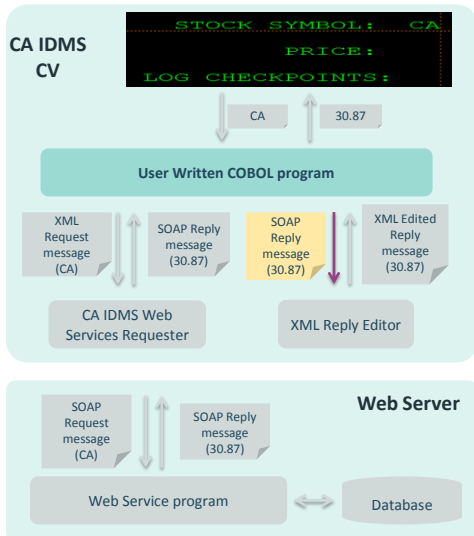
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## CA IDMS™ as Requester

Receiving Reply from WS



User Written COBOL Program:

Sends SOAP reply message to XML Reply Editor

29



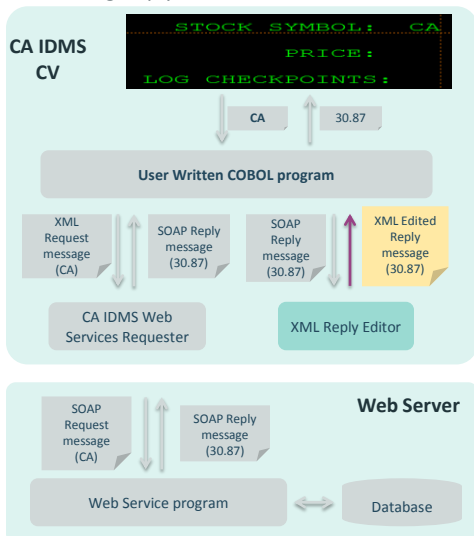
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## CA IDMS™ as Requester

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

30



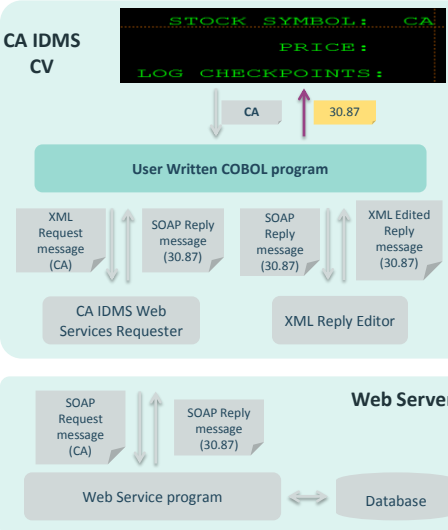
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## CA IDMS™ as Requester

### 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
-----
START-OF-ELEMENT      GetQuickQuoteResult
CONTENT-CHARACTERS    30.87
END-OF-ELEMENT        GetQuickQuoteResult
```

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



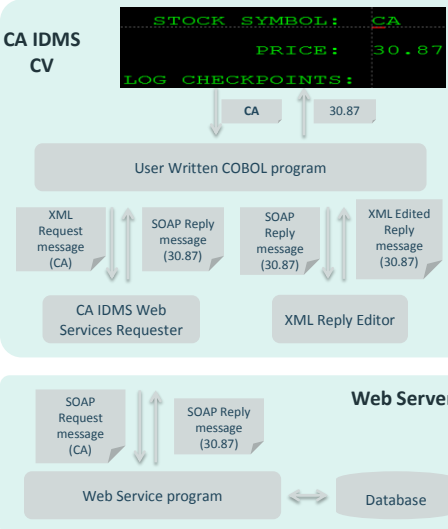
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## CA IDMS™ as Requester

### 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
```

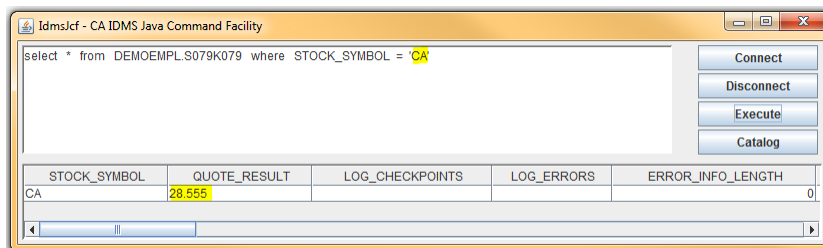
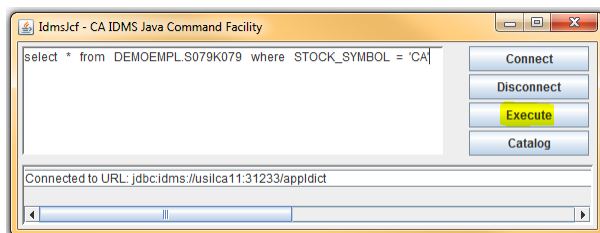


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## SQL Procedure calling Web Service in CA IDMS™ Server



34

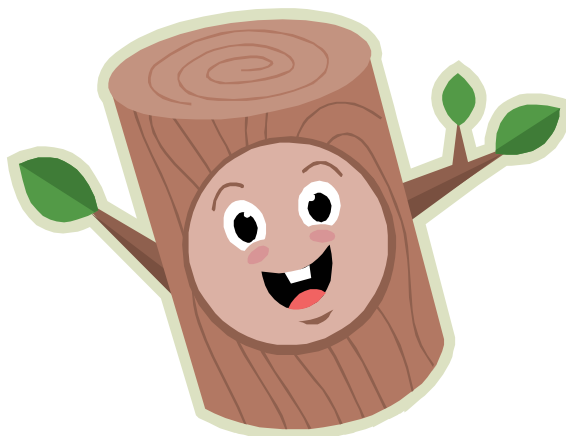


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## Web Services Logging Demo



35



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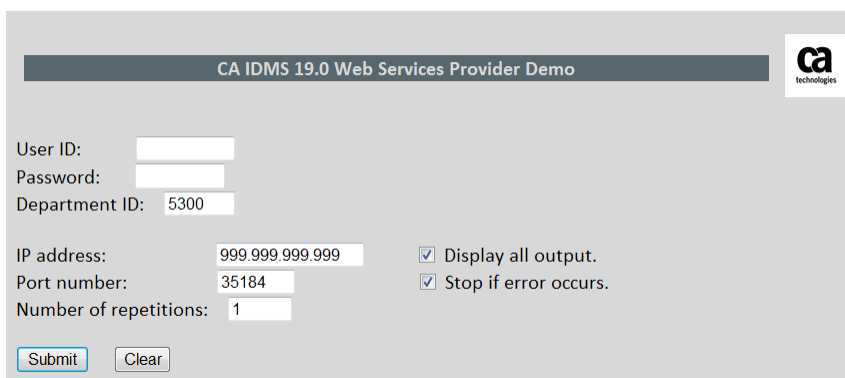
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## CA IDMS™ application as a web services provider

### Provider Demo Web Service being Called

Web application as the Web Service Requester



The screenshot shows a web application titled "CA IDMS 19.0 Web Services Provider Demo" with the CA Technologies logo in the top right corner. The form contains the following fields and controls:

- User ID:
- Password:
- Department ID:
- IP address:  ☒ Display all output.
- Port number:  ☒ Stop if error occurs.
- Number of repetitions:
- Submit:
- 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

38



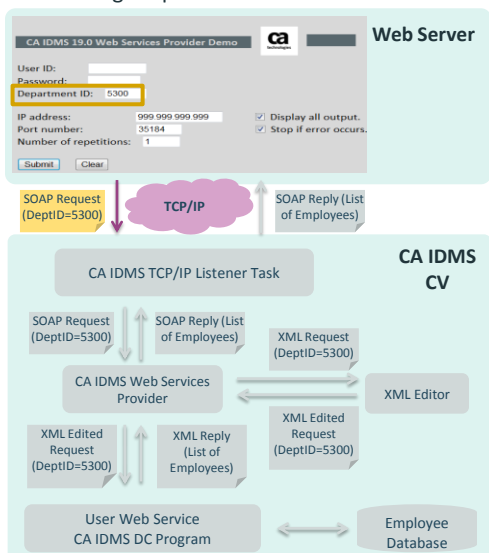
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## CA IDMS™ as Provider

Sending Request to WS



### Web Application (Requester Program):

#### Create a SOAP request message:

```
POST /S079K215 HTTP/1.1. User-Agent: Mozilla/4.0 (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"?>
<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:CVUserID>
        <tns:CVPassword>       </tns:CVPassword>
        <tns:CVSignon>
          <tns:InputFields>
            <tns:DeptID>5300</tns:DeptID>
            <tns:DBName>       </tns:DBName>
          </tns:InputFields>
        </tns:S079K215Operation>
      </soapenv:Body>
    </soapenv:Envelope>
```

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

39



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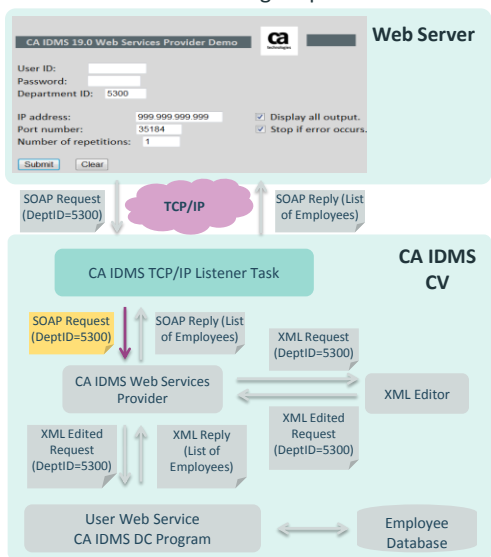
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# CA IDMS™ as Provider

## 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

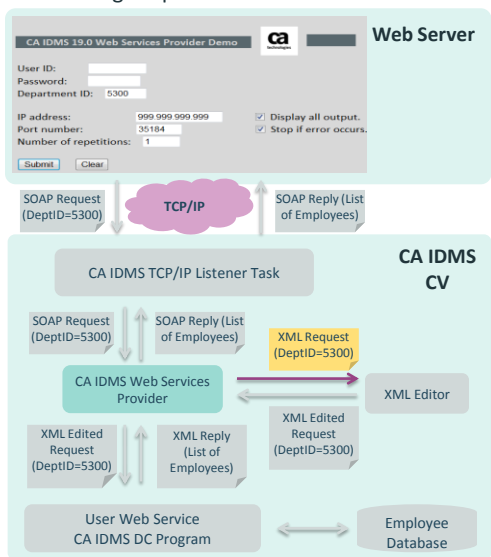
Call the CA IDMS Web Services Provider and pass the SOAP Request:

```
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><S079K2150peration
    xmlns="http://www.S079K215.Request.com">
    <CVSignon>
      <CVUserID>      </CVUserID>
      <CVPassword/>
    </CVSignon>
    <InputFields>
      <DeptID>5300</DeptID>
    </InputFields>
  </S079K2150peration></soap:Body>
</soap:Envelope>
```

Determine which User Web Service to call:

POST /S079K215

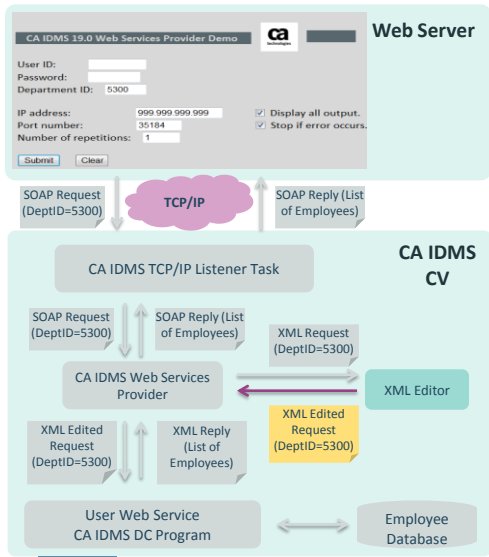
Link to XML Editor program to format the message.  
Passes XML Request message as input.





## 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):

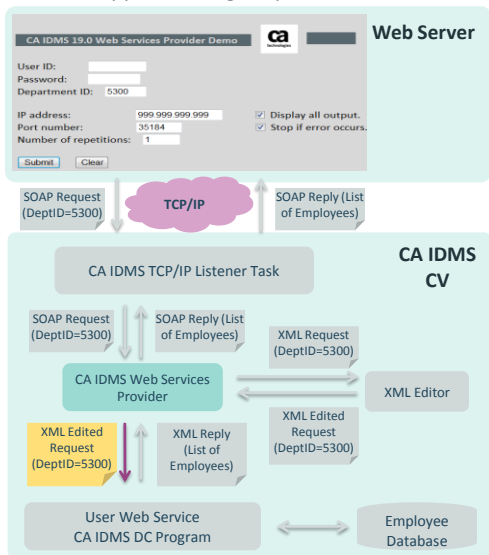
1. Checks for "Content-Type: text/xml"
2. Extract XML content only
3. Remove CRLF's.

```
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>
    <S079K2150peration
      xmlns="http://www.S079K215.Request.com">
      <CVSignon>
        <CVUserID>      </CVUserID>
        <CVPassword/>
      </CVSignon>
      <InputFields>
        <DeptID>5300</DeptID>
      </InputFields>
    </S079K2150peration>
  </soap:Body>
</soap:Envelope>
```

##### Return the XML Edited Request message to caller

## CA IDMS™ as Provider

### Web App – Sending Request to WS



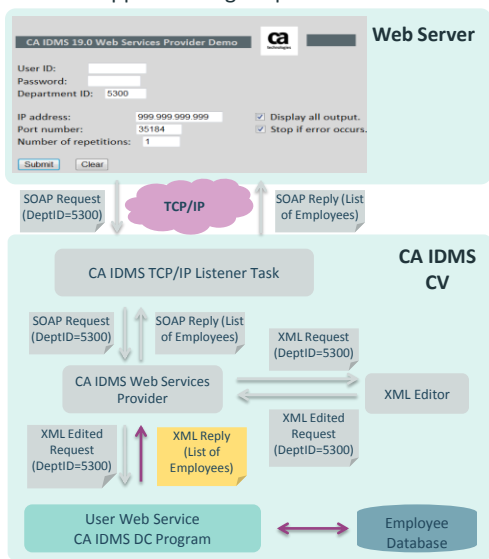
#### CA IDMS Web Services Provider Sever (SOAP Server):

##### 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
```

Working storage

## 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

44



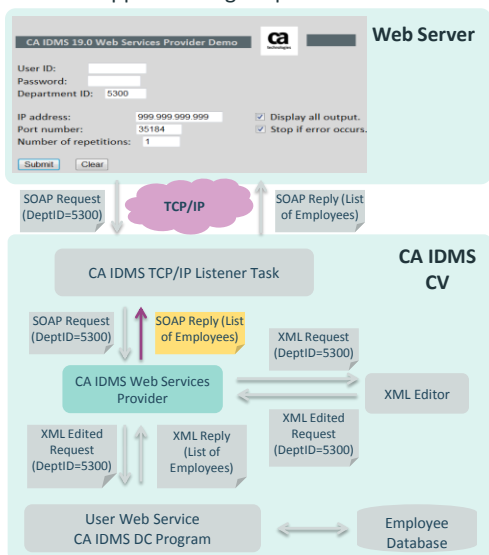
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## CA IDMS™ as Provider

## Web App – Sending Request to WS



## CA IDMS Web Services Provider Sever (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:sd="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

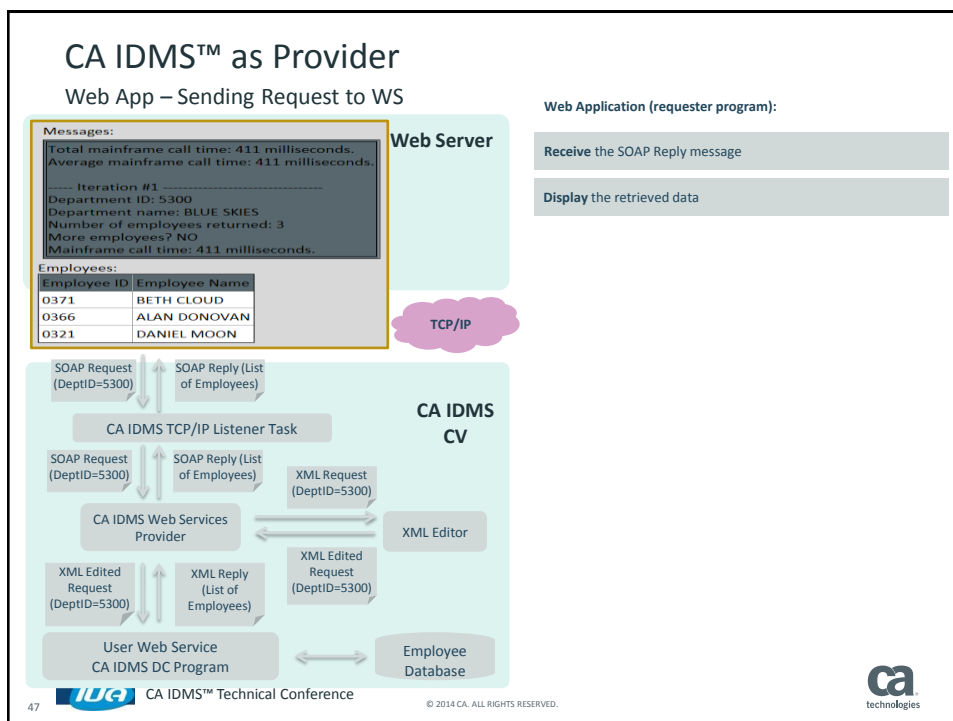
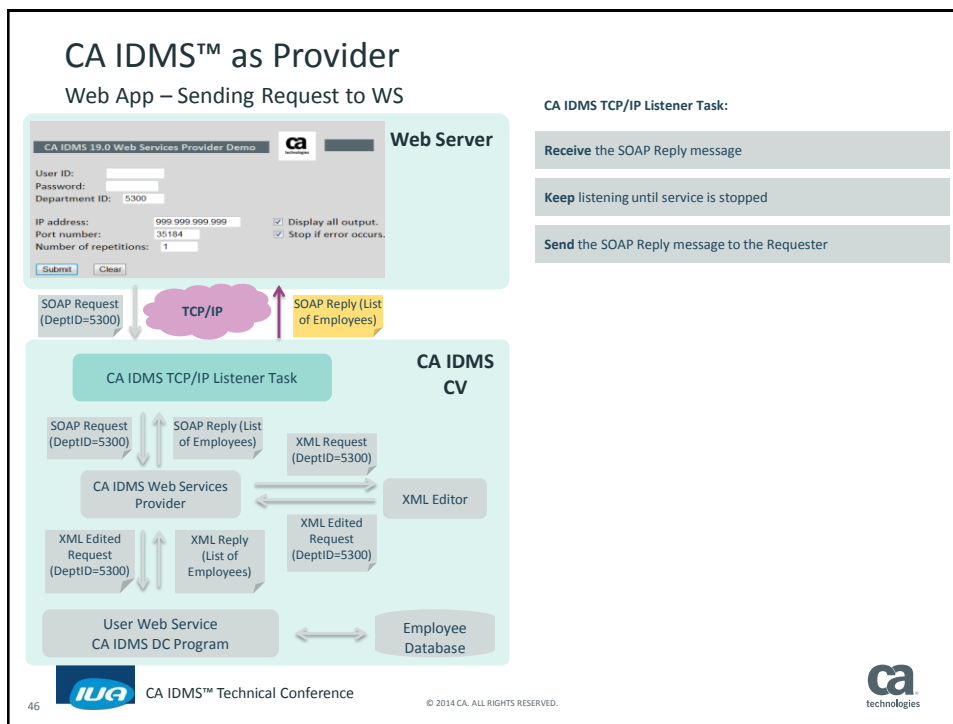
45



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## 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