



Integracija korištenjem Oracle SOA Suite platforme u heterogenom IT okruženju

Jasmin Heljić
Emina Kreštalica

19.10.2018
Rovinj



Sadržaj

Uvod

Geneza informacionog sistema

Špagetizacija informacionog sistema

Geneza uvođenja SOA pristupa

Proof of Concept

Konzumiranje servisa

Modeli integracije

Procesni tok za kreiranje kupca

Model interfejsa

Aplikativni sloj

Poziv BPEL-a iz baze podataka

Evolucija arhitekture

Servisno-orijentisana arhitektura

Business Process Execution Language

Infrastruktura

Primjer

Umjesto zaključka

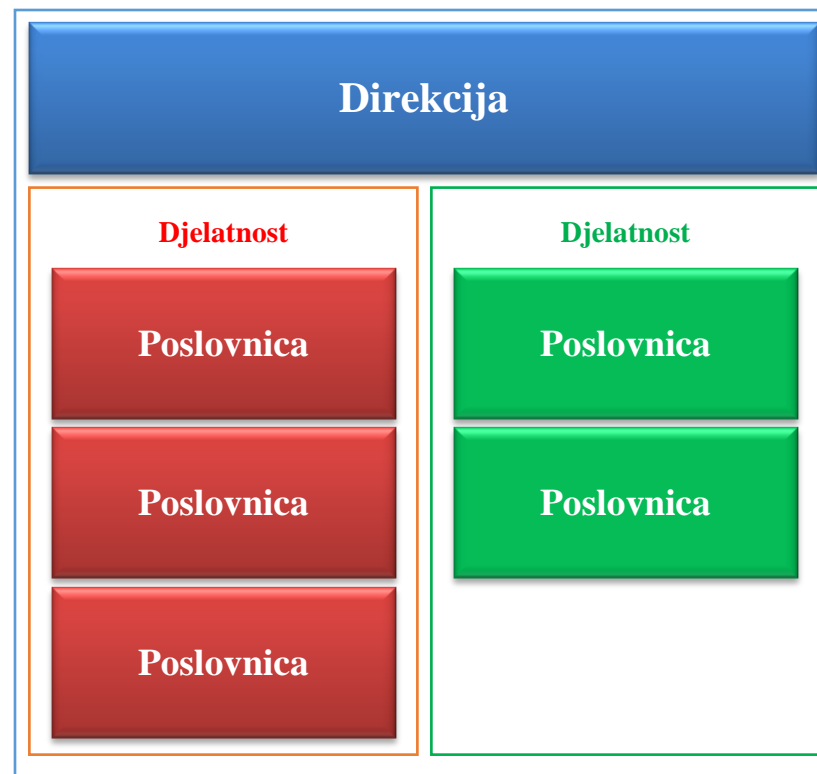
Izvori

Uvod

Javno preduzeće - preduzeće u državnom vlasništvu i/ili pod državnom kontrolom koje obavlja djelatnost od opšteg interesa.




Najčešća područja djelovanja javnih preduzeća su: energetika, komunikacije, komunalne djelatnosti, upravljanje javnim dobrima i dr.

Informacioni sistem - skup aplikacija koje automatiziraju dio poslovnih aktivnosti preduzeća.

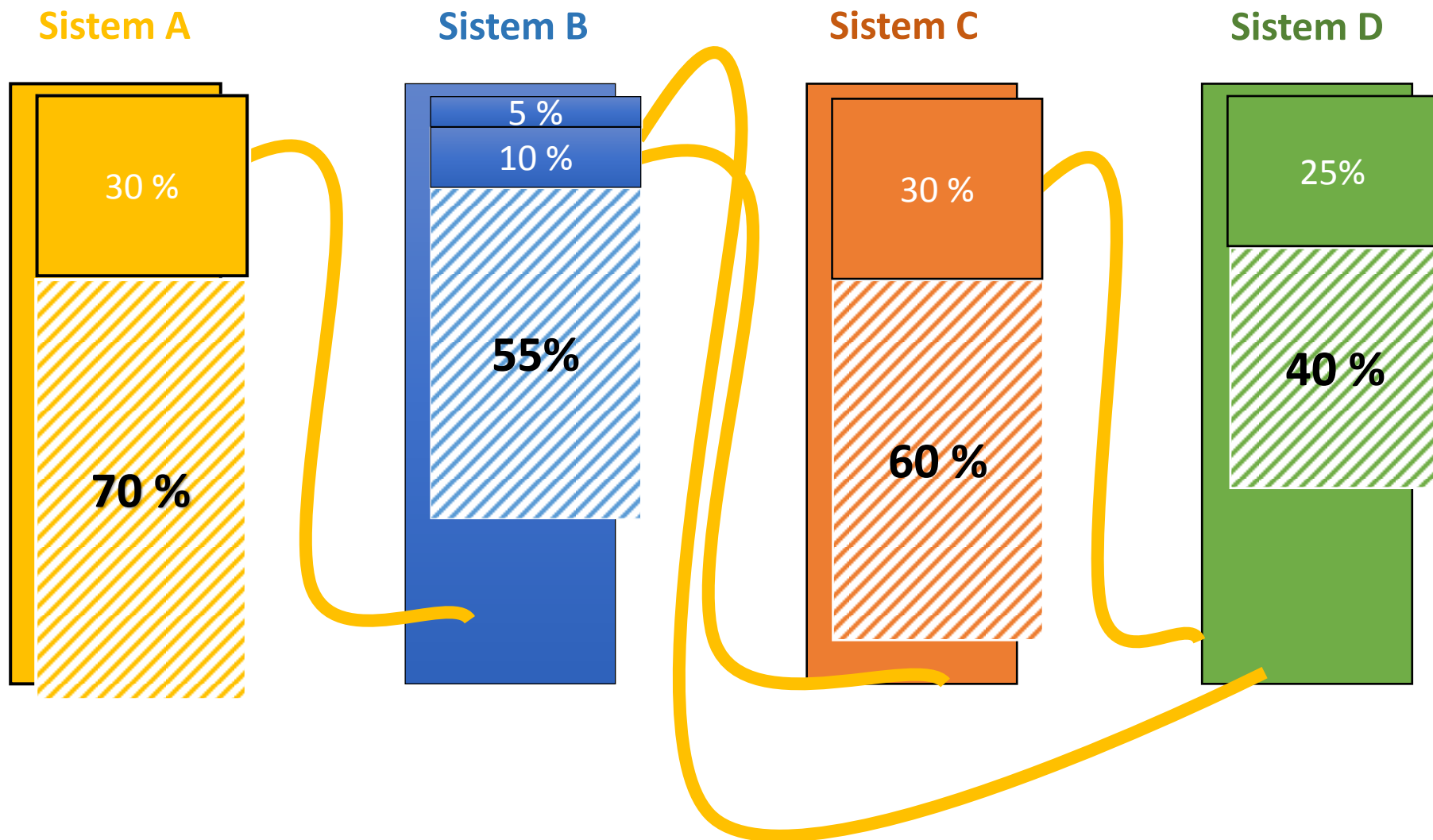


Geneza informacionog sistema

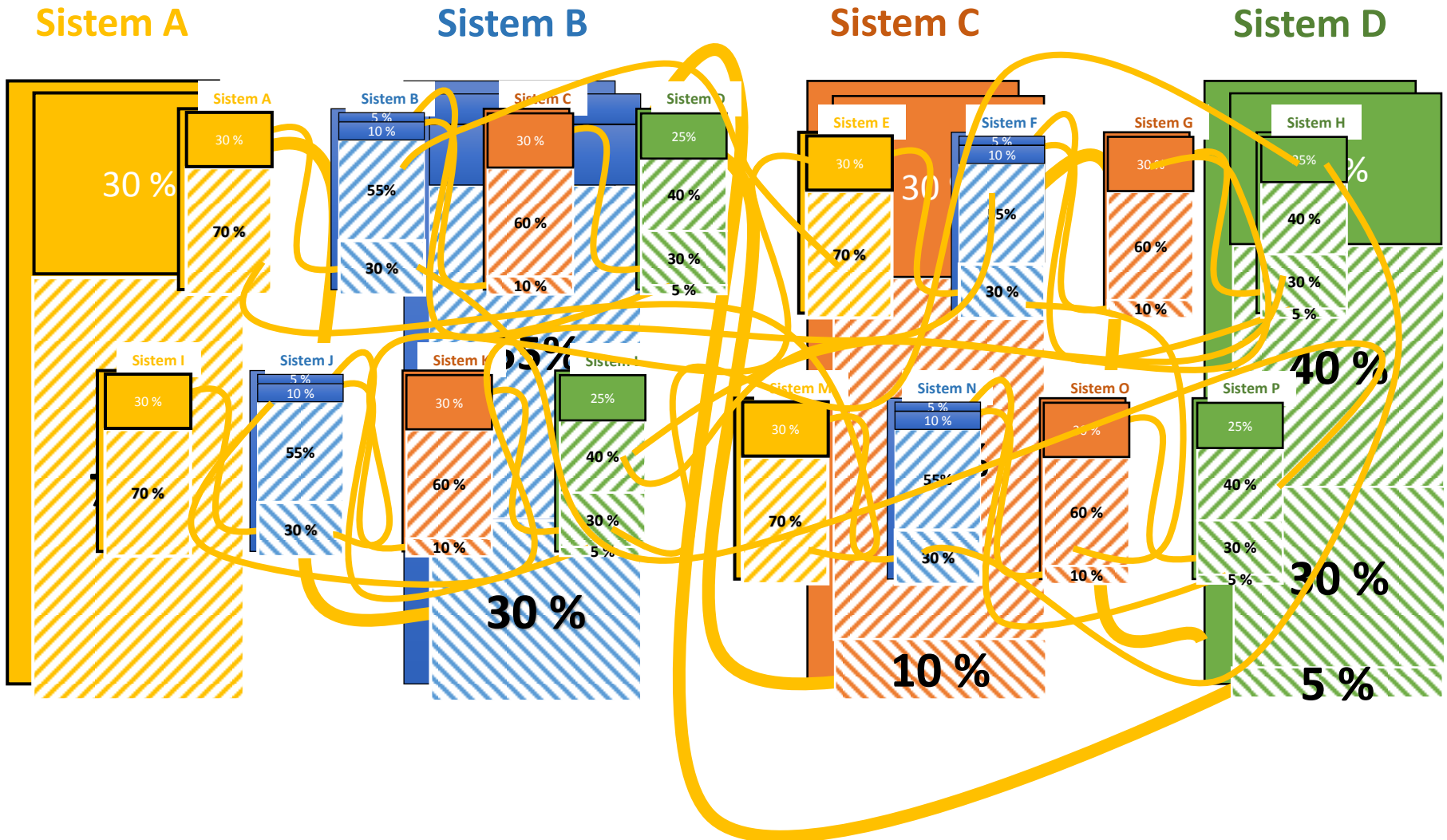


-  Zajednički informacioni sistem (Direkcija)
-  Lokalni informacioni sistem (Poslovnica)
-  Lokalni informacioni sistem (Poslovnica)

Špagetizacija informacionog sistema



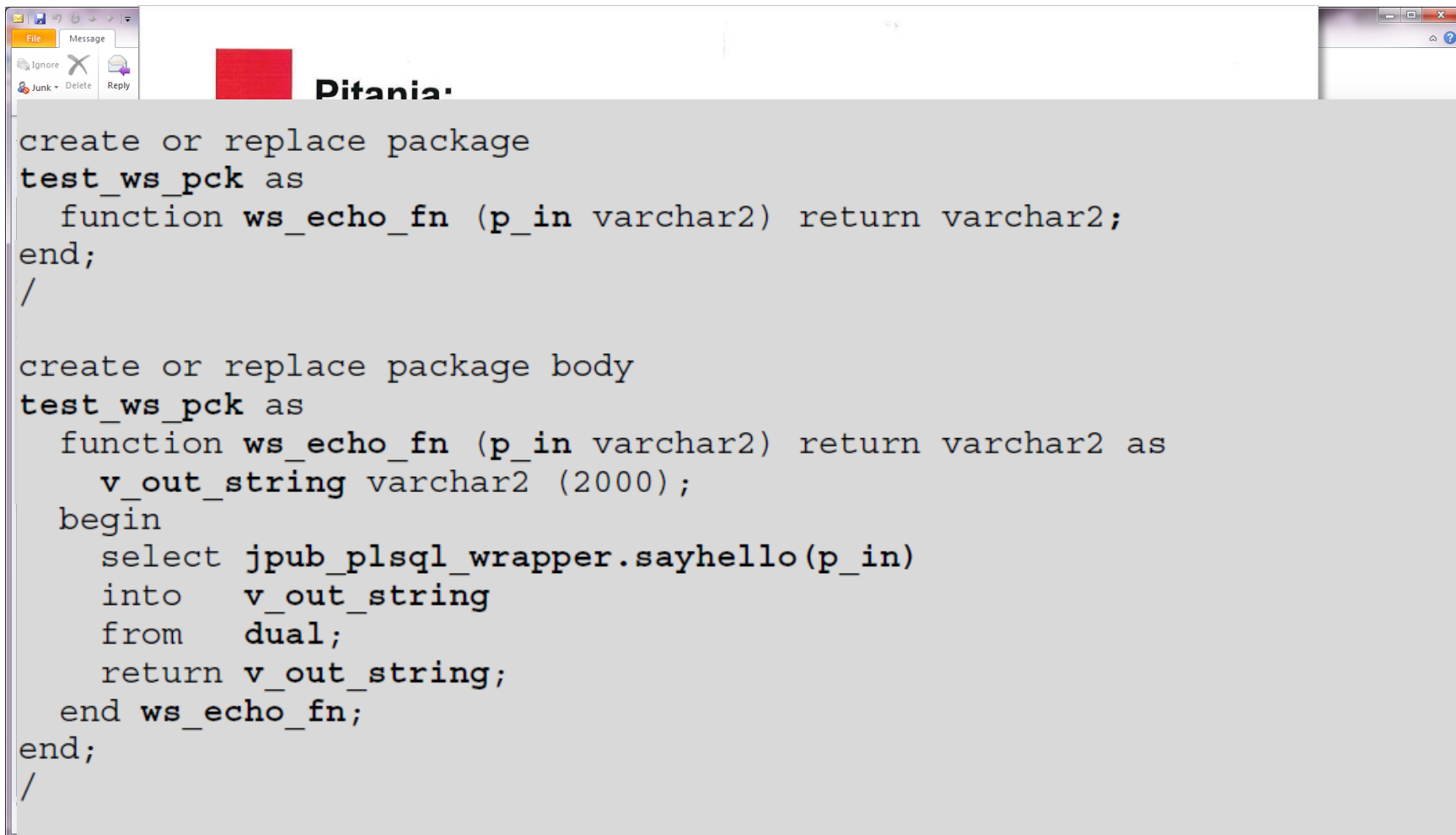
Špagetizacija informacionog sistema



Geneza uvođenja SOA pristupa

- Krajem 2009. pokrenut pilot projekat uvođenja SAP FMIS sistema u jednu od pet ED podružnica.
- Arhiviranje Oracle Forms/Reports 6i baziranih aplikacija iz segmenta FMIS-a.
- Aplikacije izvan FMIS domena trebaju imati mogućnost integracije sa SAP-om.
- Vremenski faktor je bio jedan od odlučujućih parametara za odabir načina realizacije integracije.

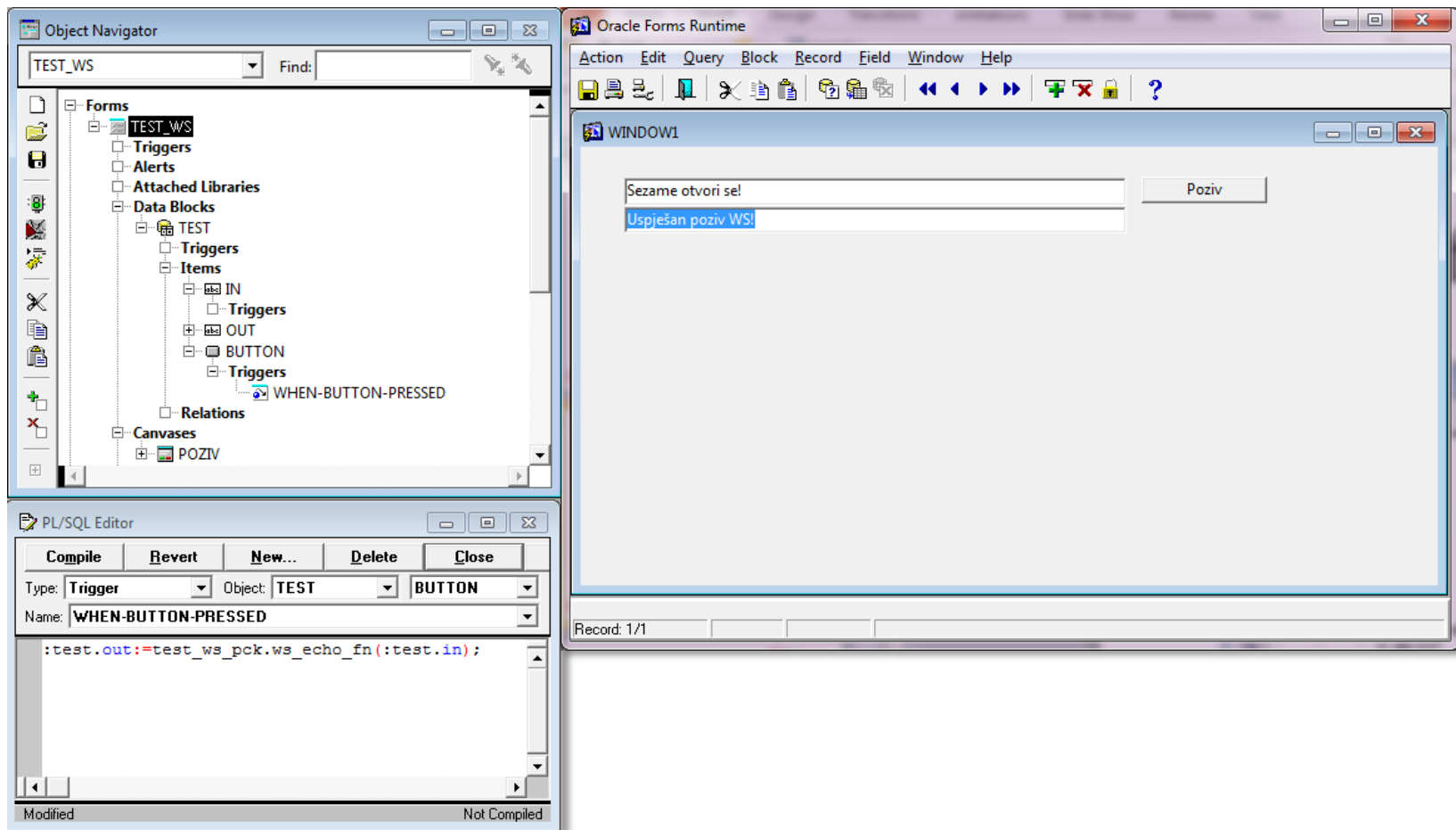
Proof of Concept



```
create or replace package
test_ws_pck as
  function ws_echo_fn (p_in varchar2) return varchar2;
end;
/

create or replace package body
test_ws_pck as
  function ws_echo_fn (p_in varchar2) return varchar2 as
    v_out_string varchar2 (2000);
  begin
    select jpub_plsql_wrapper.sayhello(p_in)
    into   v_out_string
    from   dual;
    return v_out_string;
  end ws_echo_fn;
end;
/
```

Proof of Concept



The image displays three Oracle Forms-related windows:

- Object Navigator:** Shows a tree structure for a form named TEST_WS. The tree includes Triggers, Alerts, Attached Libraries, Data Blocks (TEST), Relations, and Canvases (POZIV). Under the TEST Data Block, there are Triggers (IN, OUT, BUTTON) and Triggers (WHEN-BUTTON-PRESSED).
- PL/SQL Editor:** Shows the trigger definition for WHEN-BUTTON-PRESSED. The code is:

```
:test.out:=test_ws_pck.ws_echo_fn(:test.in);
```
- Oracle Forms Runtime:** Shows a window titled WINDOW1. It contains a text field with the text "Sezame otvori se!" and a button labeled "Poziv". Below the text field, the text "Uspješan poziv WS!" is displayed in blue, indicating a successful web service call.

Proof of Concept

➤ Reference i potrebni software za ovaj PoC

Naziv	Referenca	Package Name	Description
DBWS Callout Utilities User's Guide for RDBMS 10.1 or 10.2	[Metalink Note: ID 428775.1]	dbws-callout-utility-10131.zip	DBWS Callout Utility je alat koji omogućava da se DB server pretvori u Web service consumer okruženje.
FAQ : Oracle Database as a Web Services Client	[Metalink Note: ID 838892.1]	jpub 102.zip	<p>JPublisher Utility je alat koji je napisan u Javi i služi za generisanje Java klasa koje su reprezentacija database objekata kao što su: SQL objekti, PL/SQL paketi, itd.</p> <p>JPublisher može kreirati Java klase za sljedeće vrste objekata:</p> <ul style="list-style-type: none"> • User-defined SQL object types • Object reference types (REF types) • User-defined SQL collection types (VARRAY types or nested table types) • PL/SQL packages • Server-side Java classes • SQL queries and DML statements <p>JPublisher omogućava specifikaciju i mapiranje između ovih objekata i Java klasa.</p>
Oracle® Database JPublisher User's Guide 10g Release 2 (10.2)	Part #: B14188-01, June 2005		
Oracle® Application Server Web Services Developer's Guide 10g (10.1.3.1.0)	Part #: B28974-01, September 2006		
Oracle Database Programming Using Java and Web Services by Kuassi Mensah	ISBN 13: 978 1-55558-329-3, ISBN 10: 1-55558-329-6		
		oc4j_extended 101330.zip	OC4J je distribucija OAS koji u sebi sadrži samo J2EE i Web servise i obično se koristi u testnom okruženju. Posjeduje vlastiti HTTP/S listener koji omogućava instalaciju i konfiguraciju Java baziranih aplikacija i web servisa. Za produkcijska okruženja preporučuje se puna instalacija OAS.
		jdk-1_5_0_22-windows-1586-p.exe	Java Development Kit – razvojno okruženje za Java bazirane aplikacije.

Konzumiranje servisa

- UTL_DBWS, APEX_WEB_SERVICE, UTL_HTTP paketi koji daju infrastrukturu za konzumiranje Web servisa iz baze.
- Pojam **Web services callout** se odnosi na funkcionalnost pozivanja servisa iz PL/SQL-a:
 - Korisnik poziva PL/SQL wrapper
 - PL/SQL wrapper poziva Java stored proceduru
 - Java stored procedura poziva klijent proxy
 - Klijent proxy koristi Web services klijent run time za poziv Web servisa
- Java stored procedure wrapper je potreban srednji sloj za publikaciju *instance* metoda klijent proxy klase kao statičnih metoda, jer PL/SQL podržava samo statične metode.

Konzumiranje servisa

- Generisanje Java i PL/SQL wrappera za Web servis klijenta i njegovo pozivanje SQL iskazom

1. Identifikacija Web servisa kojeg želimo pozvati

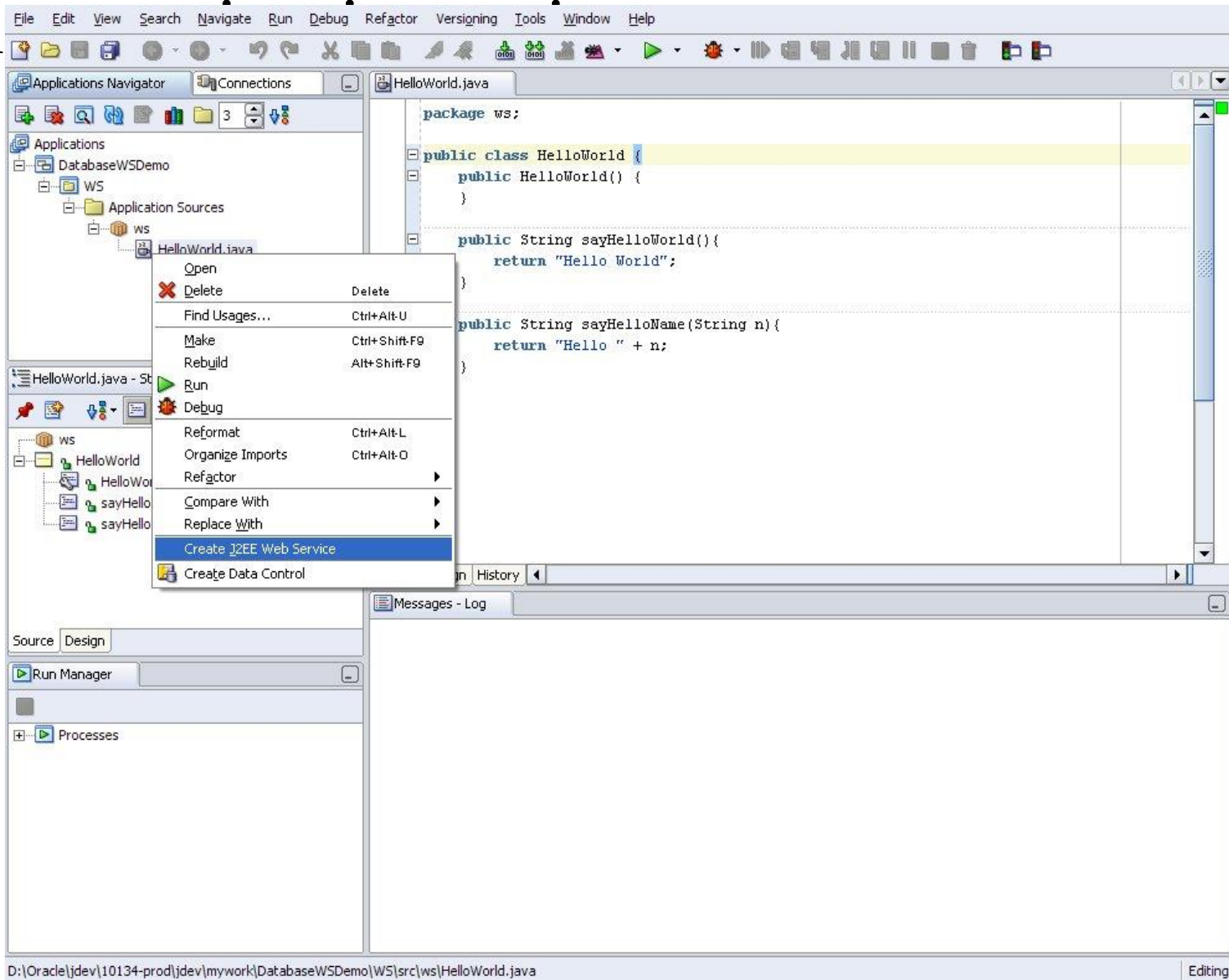
2. Poziv JPublisher sa odgovarajućim opcijama za generisanje klijent proxyja, Java i PL/SQL wrappera i njihovo upunjavanje u bazu podataka

```
%jpub -user=username -sysuser=sysuser_name/sysuser_password  
-proxywsdl=WSDL_URL -endpoint=Web_services_endpoint
```

3. Poziv Web servisa iz baze podataka

```
SQL> select jpub_plsql_wrapper.sayhello('hello') from dual
```

K



The screenshot shows an IDE window titled 'HelloWorld.java'. The code editor contains the following Java code:

```
package ws;  
  
public class HelloWorld {  
    public HelloWorld() {  
    }  
  
    public String sayHelloWorld(){  
        return "Hello World";  
    }  
  
    public String sayHelloName(String n){  
        return "Hello " + n;  
    }  
}
```

A context menu is open over the code, listing the following actions:

- Open
- Delete
- Delete
- Find Usages... (Ctrl+Alt-U)
- Make (Ctrl+Shift-F9)
- Rebuild (Alt+Shift-F9)
- Run
- Debug
- Reformat (Ctrl+Alt-L)
- Organize Imports (Ctrl+Alt-O)
- Refactor
- Compare With
- Replace With
- Create J2EE Web Service
- Create Data Control

The IDE interface includes a menu bar (File, Edit, View, Search, Navigate, Run, Debug, Refactor, Versioning, Tools, Window, Help), a toolbar, and several panels: Applications Navigator, Connections, Applications, DatabaseWSDemo, Application Sources, ws, HelloWorld.java, Messages - Log, Run Manager, and Processes. The status bar at the bottom shows the file path: D:\Oracle\jdev\10134-prod\jdev\mywork\DatabaseWSDemo\WS\src\ws\HelloWorld.java and the mode: Editing.

Konzumiranje servisa

Primjer PL/SQL koda za poziv Web servisa

```
CREATE OR REPLACE PACKAGE HelloWorld
AS

FUNCTION SayHelloWorld RETURN VARCHAR2;
END HelloWorld;
```

```
CREATE OR REPLACE PACKAGE BODY HelloWorld AS

FUNCTION SayHelloWorld
RETURN VARCHAR2
IS

service_          sys.utl_dbws.SERVICE;
call_             sys.utl_dbws.CALL;
service_qname    sys.utl_dbws.QNAME;
port_qname       sys.utl_dbws.QNAME;
xoperation_qname sys.utl_dbws.QNAME;
xstring_type_qname sys.utl_dbws.QNAME;
response         sys.XMLTYPE;
request          sys.XMLTYPE;
```


Konzumiranje servisa

BEGIN

```
service_qname := sys.utl_dbws.to_qname(null, 'SayHelloWorld');  
service_      := sys.utl_dbws.create_service(service_qname);  
call_        := sys.utl_dbws.create_call(service_);
```

```
sys.utl_dbws.set_target_endpoint_address  
(call_, 'http://localhost:8888/helloworld');
```

```
sys.utl_dbws.set_property(call_  
                          , 'SOAPACTION_USE'  
                          , 'TRUE'  
                          );
```

```
sys.utl_dbws.set_property(call_  
                          , 'SOAPACTION_URI'  
                          , 'http://ws//sayHelloWorld'  
                          );
```

```
sys.utl_dbws.set_property(call_  
                          , 'OPERATION_STYLE'  
                          , 'document'  
                          );
```

Konzumiranje servisa

```
request := sys.XMLTYPE('<sayHelloWorldElement
xmlns="http://ws/types/" />');

response :=sys.utl_dbws.invoke(call_, request);
return response.extract('//child::text()',
'xmlns="http://localhost:8888/endpoint"').getstringval();

END SayHelloWorld;

END HelloWorld;
```

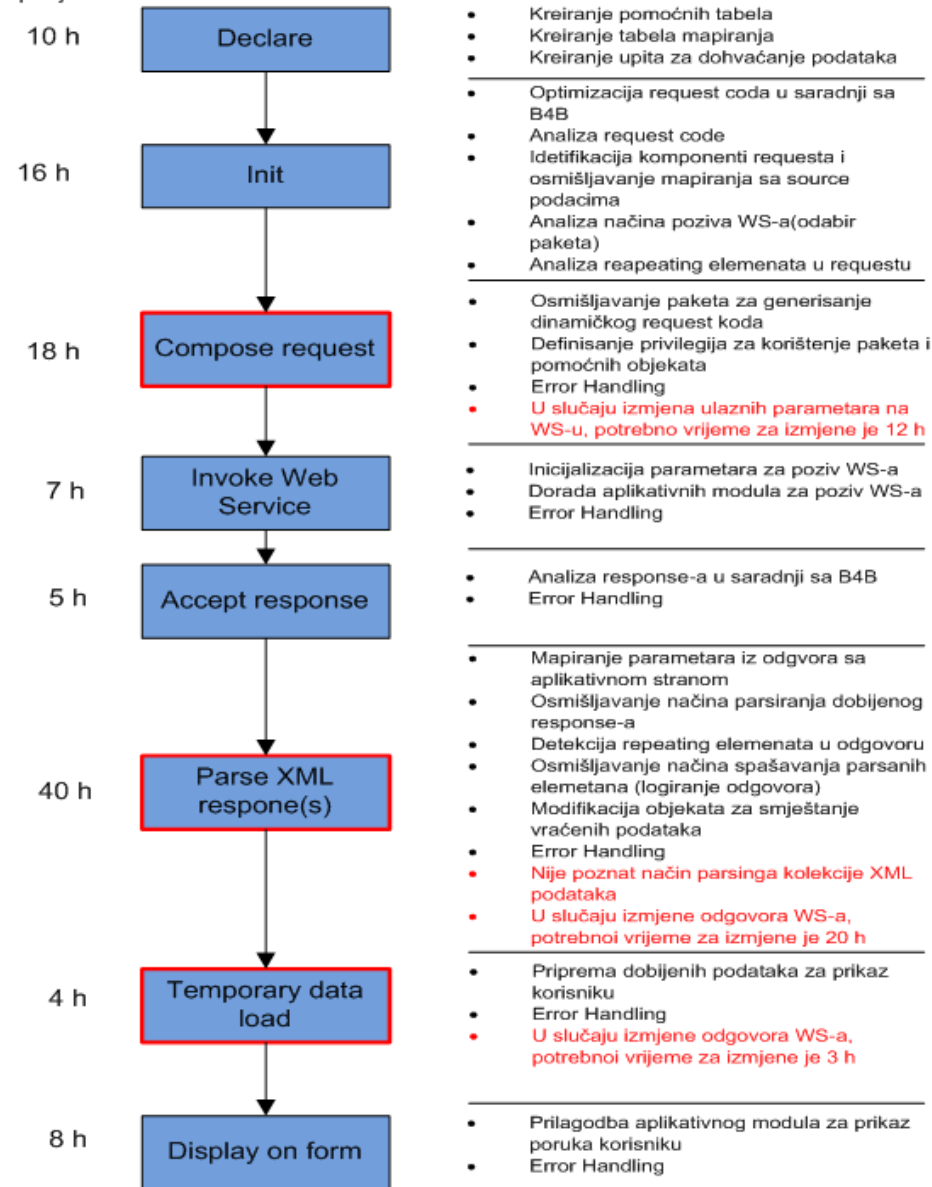
```
SQL> select helloworld.sayhelloworld from dual from dual
```

Modeli integracije

- **Integracija sa SAP-om podrazumijeva pozive servisa koji vraćaju kompleksnu strukturu odgovora.**
 - Model 1: PL/SQL bazirana integracija (DB – SAP)
 - Odgovor se mora „ručno“ dekodirati i prikazati u razumljivom formatu
 - *RPCs cannot use variables with schema-level object types in this release.*
 - Model 2: BPEL bazirana integracija (DB – BPEL – SAP)
- Uporedna procjena vremena za razvoj konkretnog interfejsa između Oracle Forms/Reports 6i bazirane aplikacije i SAP-a
 - Interfejs za kreiranje prodajnog naloga u SAP-u iniciranjem postupka u Oracle Forms/Reports 6i baziranoj aplikaciji

PL/SQL bazirana integracija

vremenska procjena



Error handling

- Timeout error handling
- Bad SOAP message error handling
- 404 Not found error handling
- 500 Internal server error
- Parsing error
- itd...

BPEL bazirana integracija

vremenska
procjena

10 h

Declare

- Kreiranje pomoćnih tabela
- Kreiranje tabela mapiranja
- Kreiranje upita za dohvaćanje podataka

4 h

Invoke BPEL WS

- Pozivanje BPEL WS-a
- Error Handling

2 h

Init

Compose
request

Invoke Web
Service

BPEL

Accept
response

Parse XML
response(s)

Temporary data
load

- Dohvat podataka (DB adapter wizard)
- Mapiranje (Drag and drop)
- Invoke WS i accept response (single activity)
- Prosleđivanje response-a log proceduri (DB adapter wizard)
- Update podataka na bazi (DB adapter wizard)
- Error Handling
- ...
- U slučaju izmjena ulaznih parametara na WS-u, potrebno vrijeme za izmjene je 1 h
- U slučaju izmjene odgovora WS-a, potrebni vrijeme za izmjene je 1 h

2 h

Parse BPEL XML
response

- Parsanje jednog elementa
- Error handling

8 h

Display on form

- Prilagodba aplikativnog modula za prikaz poruka korisniku
- Error Handling

26 h

+1h

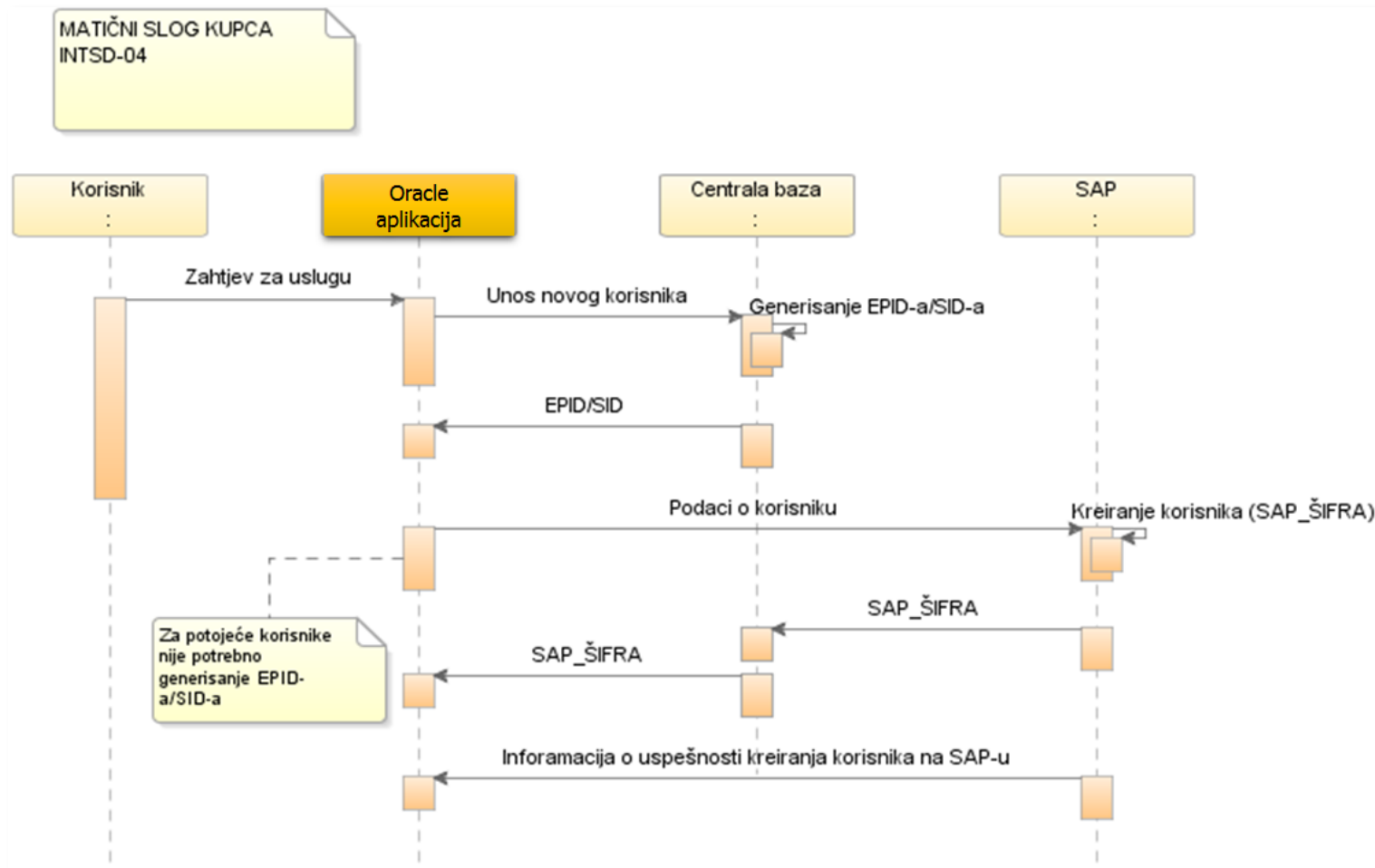
+1h

Procesni tok za kreiranje kupca

1. Kupac podnosi zahtjev za uslugu.
2. Ako je u pitanju novi kupac kreiranje se vrši u Centralnoj bazi kupaca putem Oracle aplikacije za postupak priključenja kupaca:
 - a. Šalje se zahtjev za kreiranje kupca na Centralnoj bazi gdje se generiše jedinstveni identifikator kupca (EPID broj).
 - b. EPID broj se koristi kao dio poruke koja se šalje SAP-u gdje se vrši kreiranje SAP kupca i generiše se SAP šifra.
 - c. SAP šifra se prosljeđuje Centralnoj bazi gdje se vrši povezivanje sa EPID-om
3. Na aplikaciji se ispisuje informacija o transakciji.

Procesni tok za kreiranje kupca

Dijagramski prikaz procesnog toka

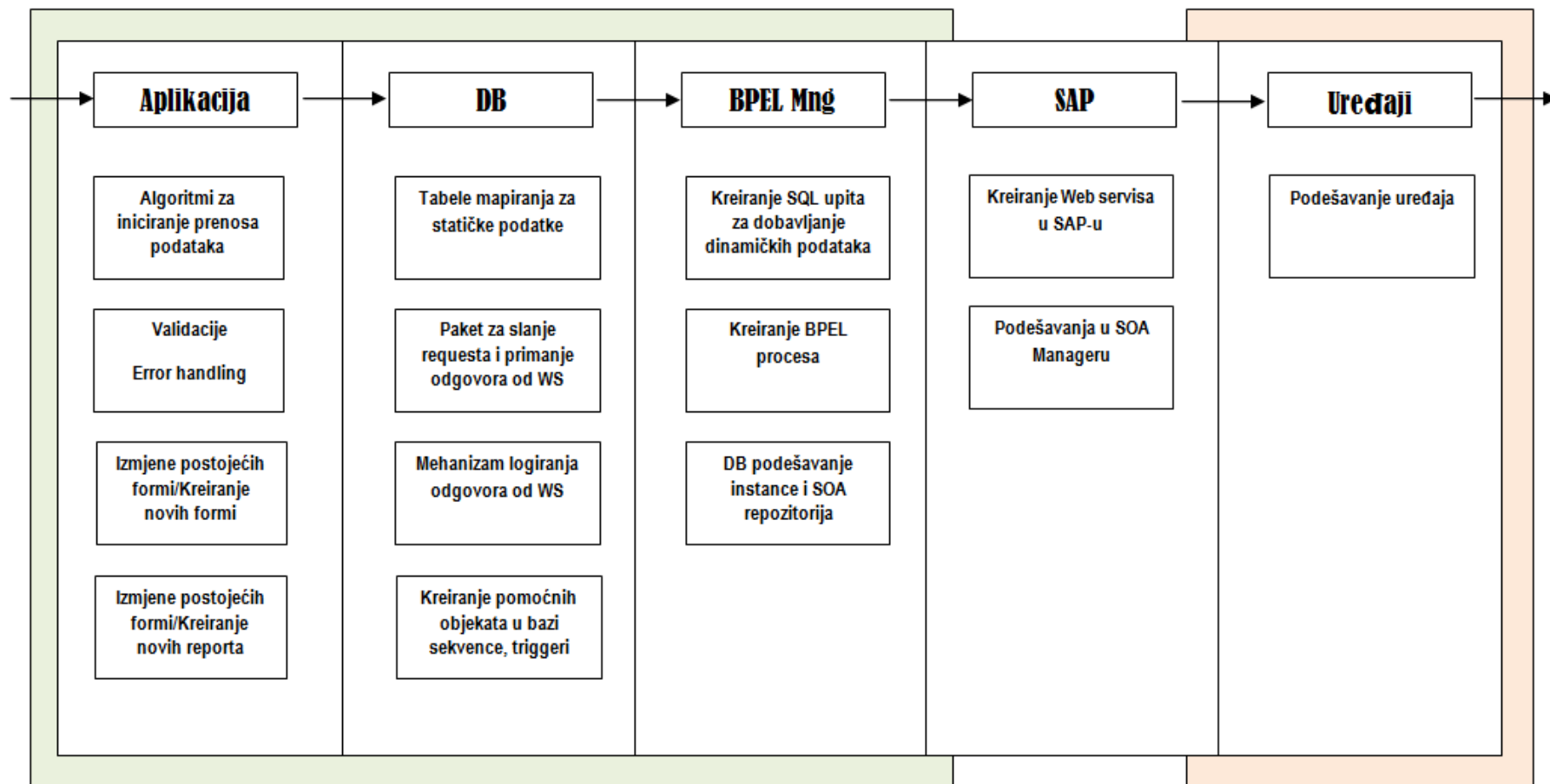


Procesni tok za kreiranje kupca

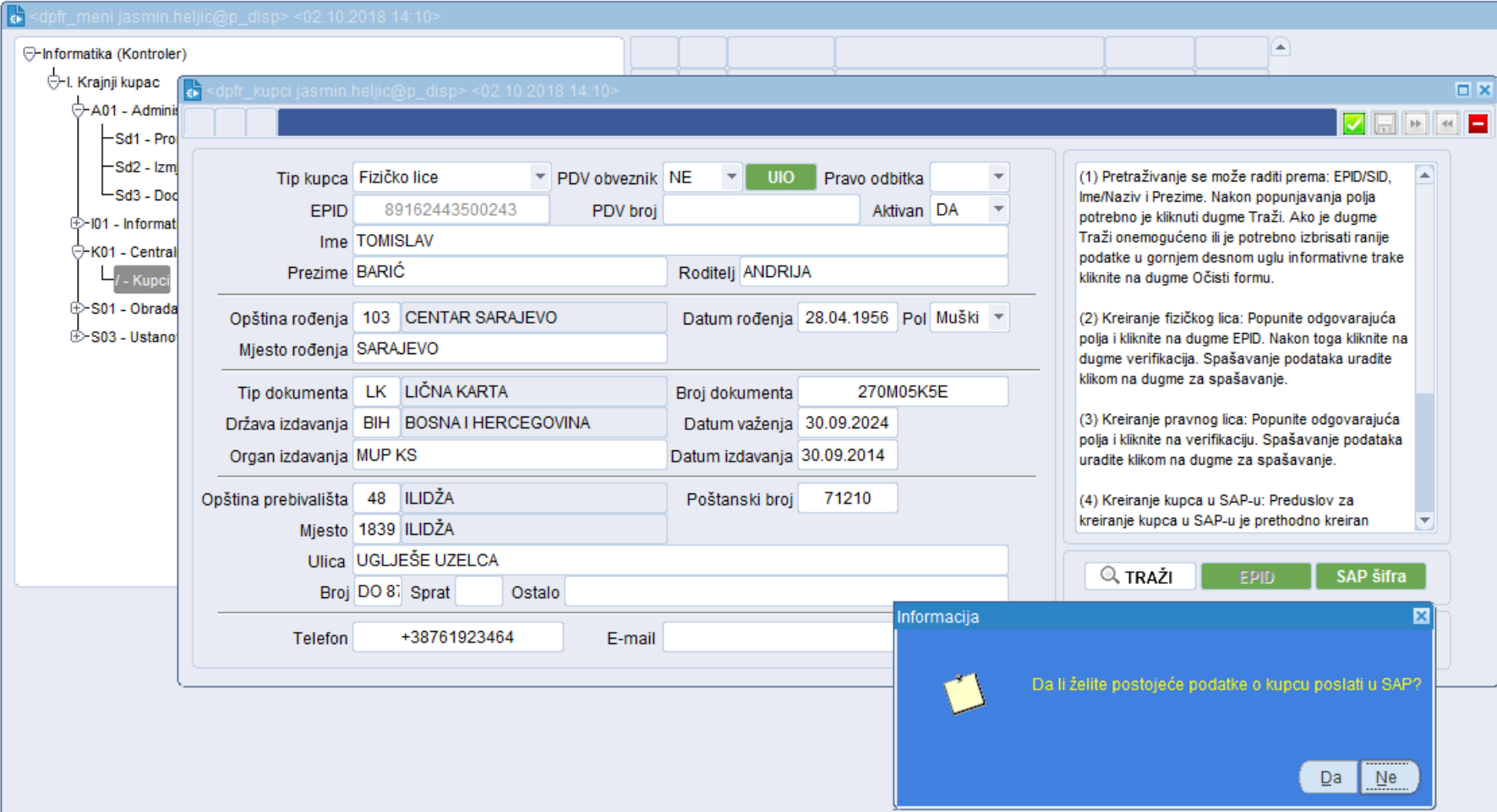
Kartica interfejsa za kreiranje matičnog sloga kupca

Interface Flow ID	Interface Flow Name	Producer (Source system)	Consumer (Destination system)	Input Data	Returned Data
INTSD-04	Matični slog kupca	DISP	SAP WS	Ktkd Default = "KPRI" Name Street PostlCod1 City Country Langu Default = "" Stcd1 Stcd3 Stkzn Stkzu Taxkd Default = "1" Bukrs Default = "1000" Akont Default = "0021153010" Fdgrv Default = "PKDOM" Vkorg Default = "1001" Vtweg Default = "10" Spart Default = "17" Kdgrp Default = "07" Waers Default = "BAM" Kalks Default = "1" Versg Default = "1" Vwerk Default = "1001" Ktgrd Default = "01" CustomerNoUpd	CustomerNo Type Id Number Message

Model interfejsa



Aplikativni sloj



<dprf_meni jasmin.heljic@p_disp> <02.10.2018 14:10>

Informatika (Kontroler)

I. Krajnji kupac

A01 - Admini

Sd1 - Pro

Sd2 - Izm

Sd3 - Doc

I01 - Informat

K01 - Central

/- Kupci

S01 - Obrada

S03 - Ustano

<dprf_kupci jasmin.heljic@p_disp> <02.10.2018 14:10>

Tip kupca Fizičko lice PDV obveznik NE **UIO** Pravo odbitka

EPID 89162443500243 PDV broj Aktivan DA

Ime TOMISLAV

Prezime BARIĆ Roditelj ANDRIJA

Opština rođenja 103 CENTAR SARAJEVO Datum rođenja 28.04.1956 Pol Muški

Mjesto rođenja SARAJEVO

Tip dokumenta LK LIČNA KARTA Broj dokumenta 270M05K5E

Država izdavanja BIH BOSNA I HERCEGOVINA Datum važenja 30.09.2024

Organ izdavanja MUP KS Datum izdavanja 30.09.2014

Opština prebivališta 48 ILIDŽA Poštanski broj 71210

Mjesto 1839 ILIDŽA

Ulica UGLJEŠE UZELCA

Broj DO 8; Sprat Ostalo

Telefon +38761923464 E-mail

(1) Pretraživanje se može raditi prema: EPID/SID, Ime/Naziv i Prezime. Nakon popunjavanja polja potrebno je kliknuti dugme Traži. Ako je dugme Traži onemogućeno ili je potrebno izbrisati ranije podatke u gornjem desnom uglu informativne trake kliknite na dugme Očisti formu.

(2) Kreiranje fizičkog lica: Popunite odgovarajuća polja i kliknite na dugme EPID. Nakon toga kliknite na dugme verifikacija. Spašavanje podataka uradite klikom na dugme za spašavanje.

(3) Kreiranje pravnog lica: Popunite odgovarajuća polja i kliknite na verifikaciju. Spašavanje podataka uradite klikom na dugme za spašavanje.

(4) Kreiranje kupca u SAP-u: Preduslov za kreiranje kupca u SAP-u je prethodno kreiran

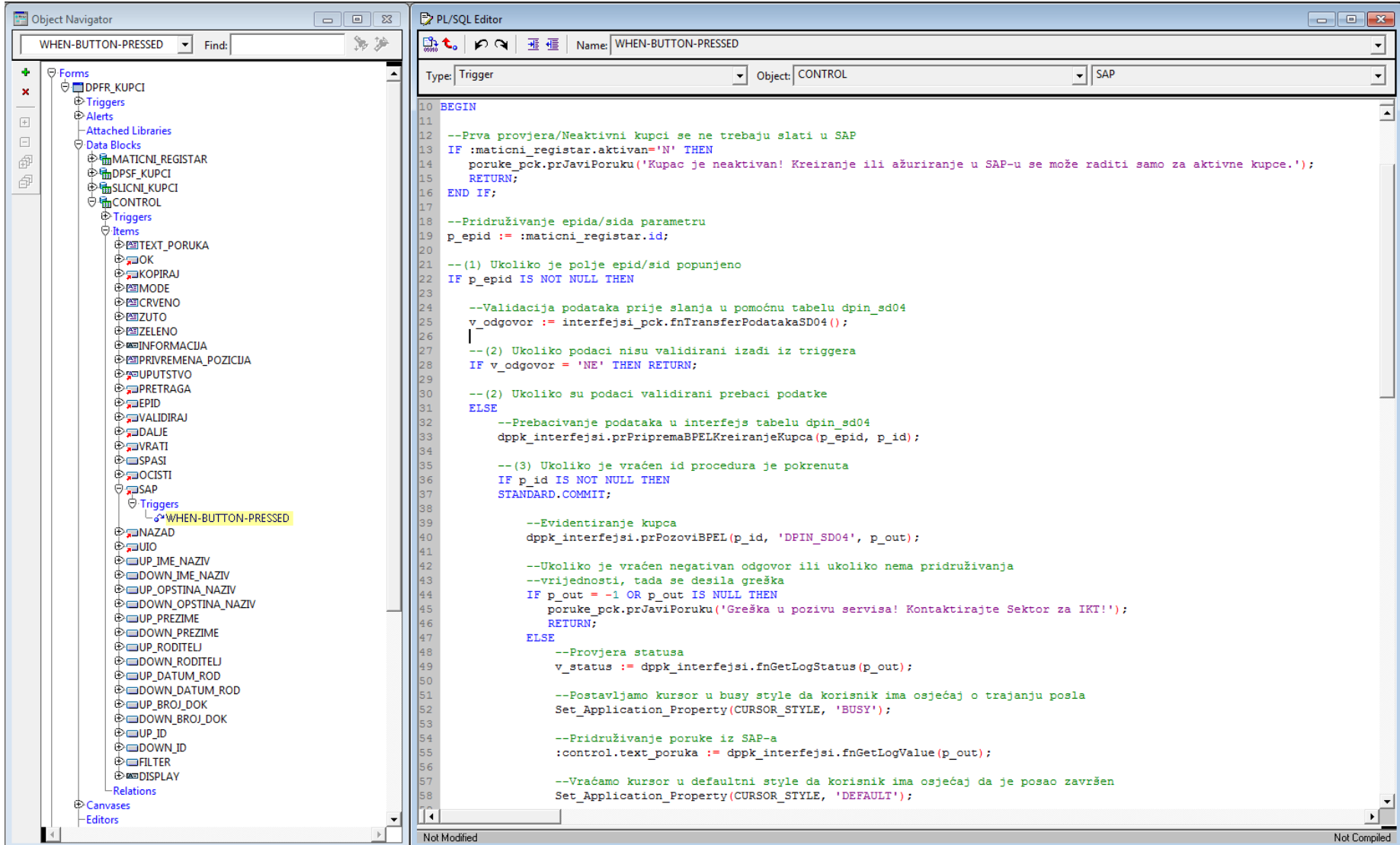
TRAŽI EPID SAP šifra

Informacija

Da li želite postojeće podatke o kupcu poslati u SAP?

Da Ne

Aplikativni sloj



The screenshot displays the Oracle SQL Developer interface. On the left, the Object Navigator shows a tree view of database objects. The 'WHEN-BUTTON-PRESSED' trigger is highlighted under the 'SAP' folder. The main window shows the PL/SQL Editor with the following code:

```
PL/SQL Editor
Name: WHEN-BUTTON-PRESSED
Type: Trigger
Object: CONTROL
SAP

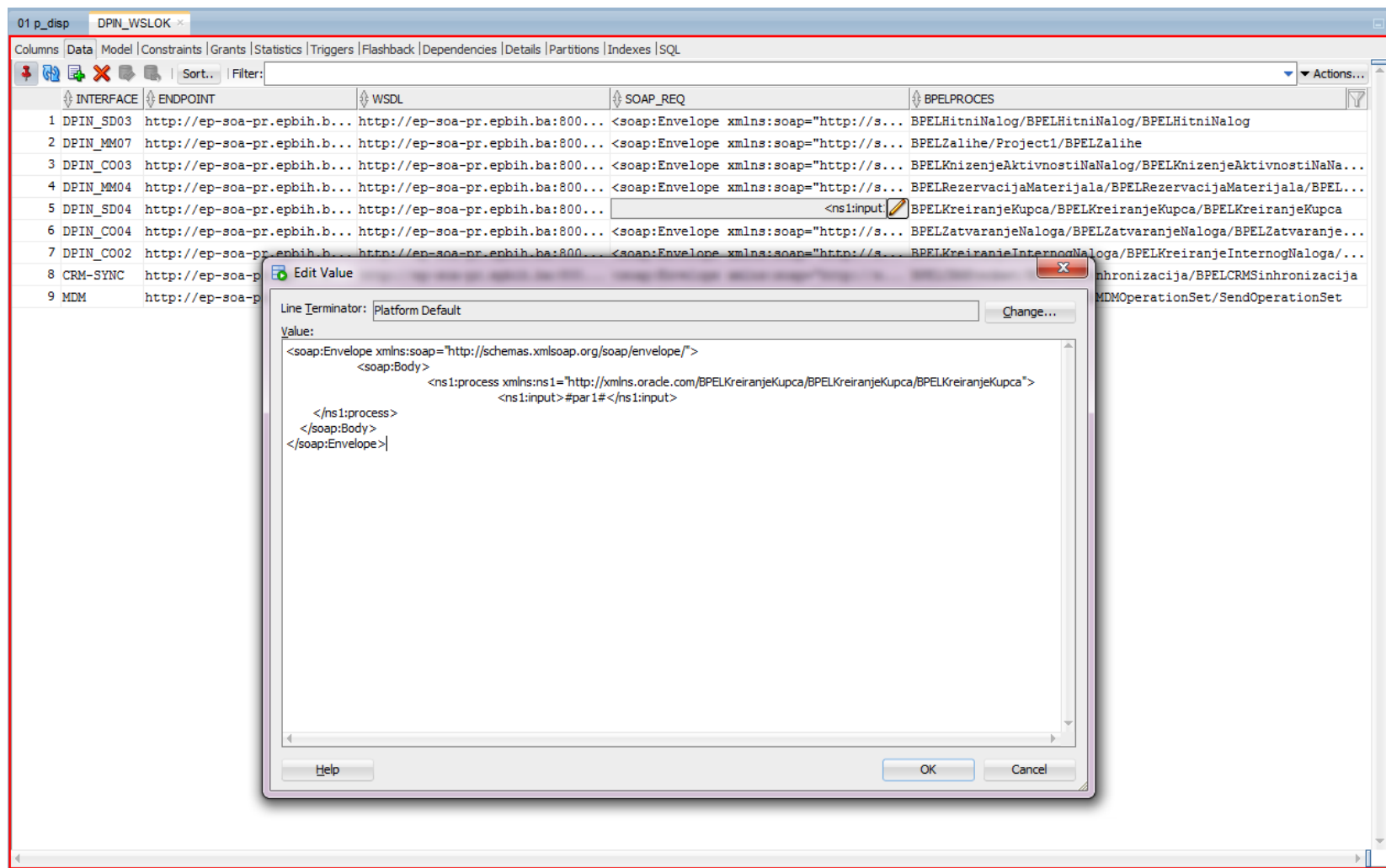
10 BEGIN
11
12 --Prva provjera/Neaktivni kupci se ne trebaju slati u SAP
13 IF :maticni_registar.aktivan='N' THEN
14     poruke_pck.prJaviPoruku('Kupac je neaktivan! Kreiranje ili ažuriranje u SAP-u se može raditi samo za aktivne kupce. ');
15     RETURN;
16 END IF;
17
18 --Pridruživanje epida/sida parametru
19 p_epid := :maticni_registar.id;
20
21 --(1) Ukoliko je polje epid/sid popunjeno
22 IF p_epid IS NOT NULL THEN
23
24     --Validacija podataka prije slanja u pomoćnu tabelu dpin_sd04
25     v_odgovor := interfejsi_pck.fnTransferPodatakaSD04();
26     |
27     --(2) Ukoliko podaci nisu validirani izadi iz triggera
28     IF v_odgovor = 'NE' THEN RETURN;
29
30     --(2) Ukoliko su podaci validirani prebaci podatke
31     ELSE
32         --Prebacivanje podataka u interfejs tabelu dpin_sd04
33         dppk_interfejsi.prPripremaBPELKreiranjeKupca(p_epid, p_id);
34
35         --(3) Ukoliko je vraćen id procedura je pokrenuta
36         IF p_id IS NOT NULL THEN
37             STANDARD.COMMIT;
38
39             --Evidentiranje kupca
40             dppk_interfejsi.prPozoviBPEL(p_id, 'DPIN_SD04', p_out);
41
42             --Ukoliko je vraćen negativan odgovor ili ukoliko nema pridruživanja
43             --vrijednosti, tada se desila greška
44             IF p_out = -1 OR p_out IS NULL THEN
45                 poruke_pck.prJaviPoruku('Greška u pozivu servisa! Kontaktirajte Sektor za IKT!');
46                 RETURN;
47             ELSE
48                 --Provjera statusa
49                 v_status := dppk_interfejsi.fnGetLogStatus(p_out);
50
51                 --Postavljamo kursor u busy style da korisnik ima osjećaj o trajanju posla
52                 Set_Application_Property(CURSOR_STYLE, 'BUSY');
53
54                 --Pridruživanje poruke iz SAP-a
55                 :control.text_poruka := dppk_interfejsi.fnGetLogValue(p_out);
56
57                 --Vraćamo kursor u defaultni style da korisnik ima osjećaj da je posao završen
58                 Set_Application_Property(CURSOR_STYLE, 'DEFAULT');
```

Poziv BPEL-a iz baze podataka

Primjer procedure za poziv Web servisa

```
PROCEDURE prpozovibpel (  
    p_id          IN NUMBER,  
    p_interfejs  IN VARCHAR2,  
    p_out        OUT NUMBER  
) AS  
  
    soap_request  VARCHAR2(30000);  
    soap_respond  VARCHAR2(30000);  
    http_req      utl_http.req;  
    http_resp     utl_http.resp;  
    resp          XMLTYPE;  
  
    ws_end_point  VARCHAR2(4000);  
    t_wslog       dpty_sapodgovor_coll := dpty_sapodgovor_coll();  
  
    v_out         VARCHAR2(4000);  
    v_out_desc    VARCHAR2(4000);  
    v_bpelproces  VARCHAR2(4000);  
    v_bpelodgovor VARCHAR2(4000);  
    v_value       VARCHAR2(4000);  
    i             INTEGER;
```

Poziv BPEL-a iz baze podataka



The screenshot shows a database management tool interface with a table of BPEL processes. The table has columns for INTERFACE, ENDPOINT, WSDL, SOAP_REQ, and BPELPROCES. An 'Edit Value' dialog box is open, showing the XML content for the selected row.

INTERFACE	ENDPOINT	WSDL	SOAP_REQ	BPELPROCES
1 DPIN_SD03	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELHitniNalog/BPELHitniNalog/BPELHitniNalog
2 DPIN_MM07	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELZalihe/Project1/BPELZalihe
3 DPIN_C003	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELKnizenjeAktivnostiNaNalog/BPELKnizenjeAktivnostiNaNa...
4 DPIN_MM04	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELRezervacijaMaterijala/BPELRezervacijaMaterijala/BPEL...
5 DPIN_SD04	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<ns1:input	BPELKreiranjeKupca/BPELKreiranjeKupca/BPELKreiranjeKupca
6 DPIN_C004	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELZatvaranjeNaloga/BPELZatvaranjeNaloga/BPELZatvaranje...
7 DPIN_C002	http://ep-soa-pr.epbih.b...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	BPELKreiranjeInternogNaloga/BPELKreiranjeInternogNaloga/...
8 CRM-SYNC	http://ep-soa-p...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	Sinhronizacija/BPELCRMSinhronizacija
9 MDM	http://ep-soa-p...	http://ep-soa-pr.epbih.ba:800...	<soap:Envelope xmlns:soap="http://s...	MDMOperationSet/SendOperationSet

The 'Edit Value' dialog box shows the following XML content:

```

Line Terminator: Platform Default
Value:
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ns1:process xmlns:ns1="http://xmlns.oracle.com/BPELKreiranjeKupca/BPELKreiranjeKupca/BPELKreiranjeKupca">
      <ns1:input>#par1#</ns1:input>
    </ns1:process>
  </soap:Body>
</soap:Envelope>
  
```

Poziv BPEL-a iz baze podataka

```
utl_http.set_header(http_req
                    , 'Content-Length',
                    , length(soap_request)
                    );

utl_http.set_header(http_req, 'SOAPAction', 'process');
utl_http.write_text(http_req, soap_request);

http_resp := utl_http.get_response(http_req);
utl_http.read_text(http_resp, soap_respond);
utl_http.end_response(http_resp);

resp := xmltype.createxml(soap_respond);

v_bpelodgovor := resp.extract('*/*/*/*[local-name()='result' and
namespace-uri()='http://xmlns.oracle.com/' || v_bpelproces || '" ]
/text()', 'xmlns="http://xmlns.oracle.com/' || v_bpelproces || '" ')
.getstringval ();

p_out := to_number(v_bpelodgovor);
```


Poziv BPEL-a iz baze podataka

EXCEPTION

WHEN OTHERS THEN

```
t_wslog.extend;  
t_wslog(t_wslog.count) := dpty_sapodgovor(p_interfejs  
    , 'E,  
    , NULL  
    , 'Greška pri pozivu SAPa.'  
    || chr(13)  
    || chr(10)  
    || 'Pokušajte ponovo,  
    , substr(sqlerrm,1,4000)  
    , NULL  
    , NULL  
    , NULL  
    , NULL  
    , NULL  
    , '123,  
    );
```

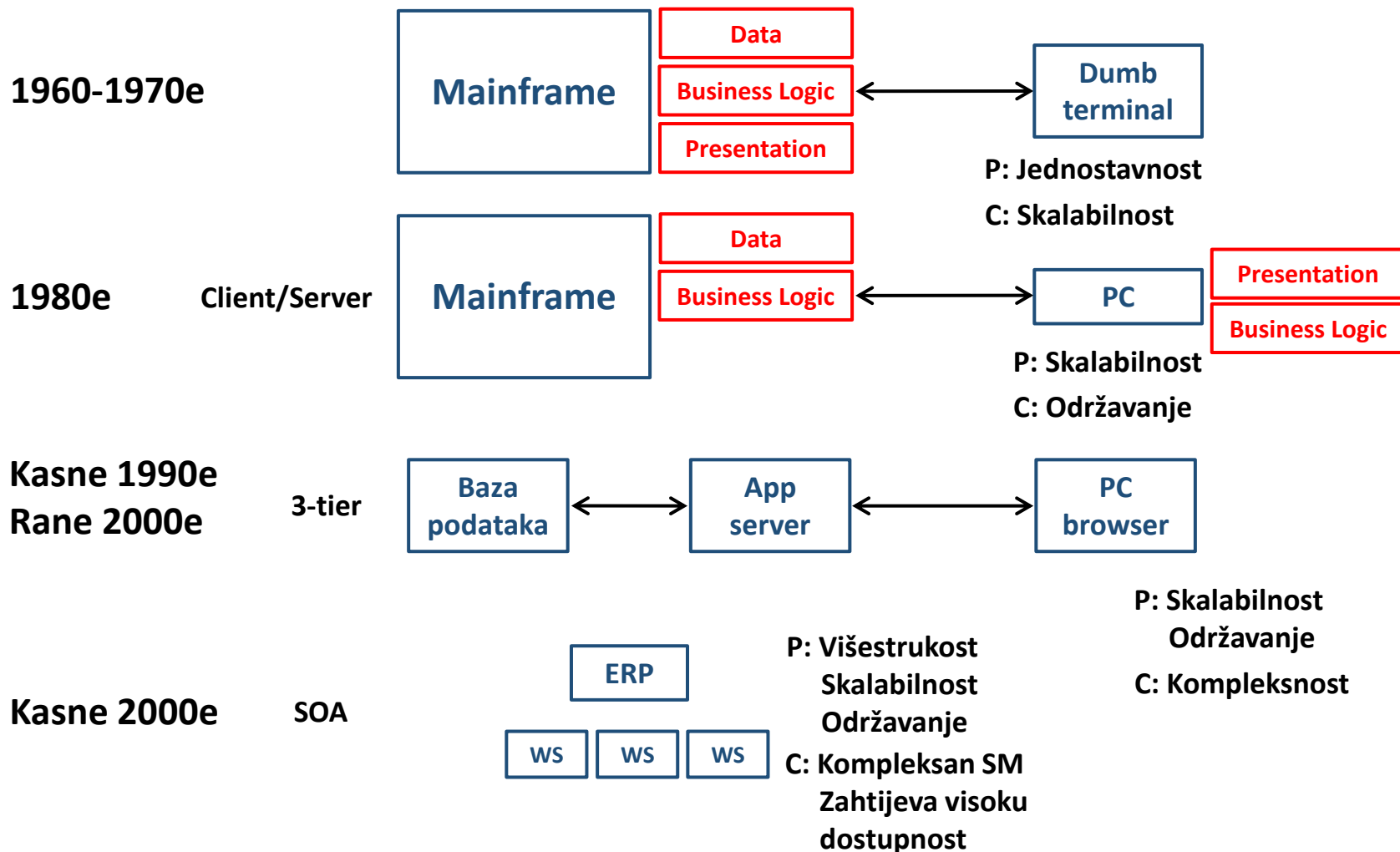
Poziv BPEL-a iz baze podataka

```
dppk_interfejsi.prcreatedpin_wslog(t_wslog
                                   , p_id
                                   , v_out
                                   , v_out_desc
                                   );

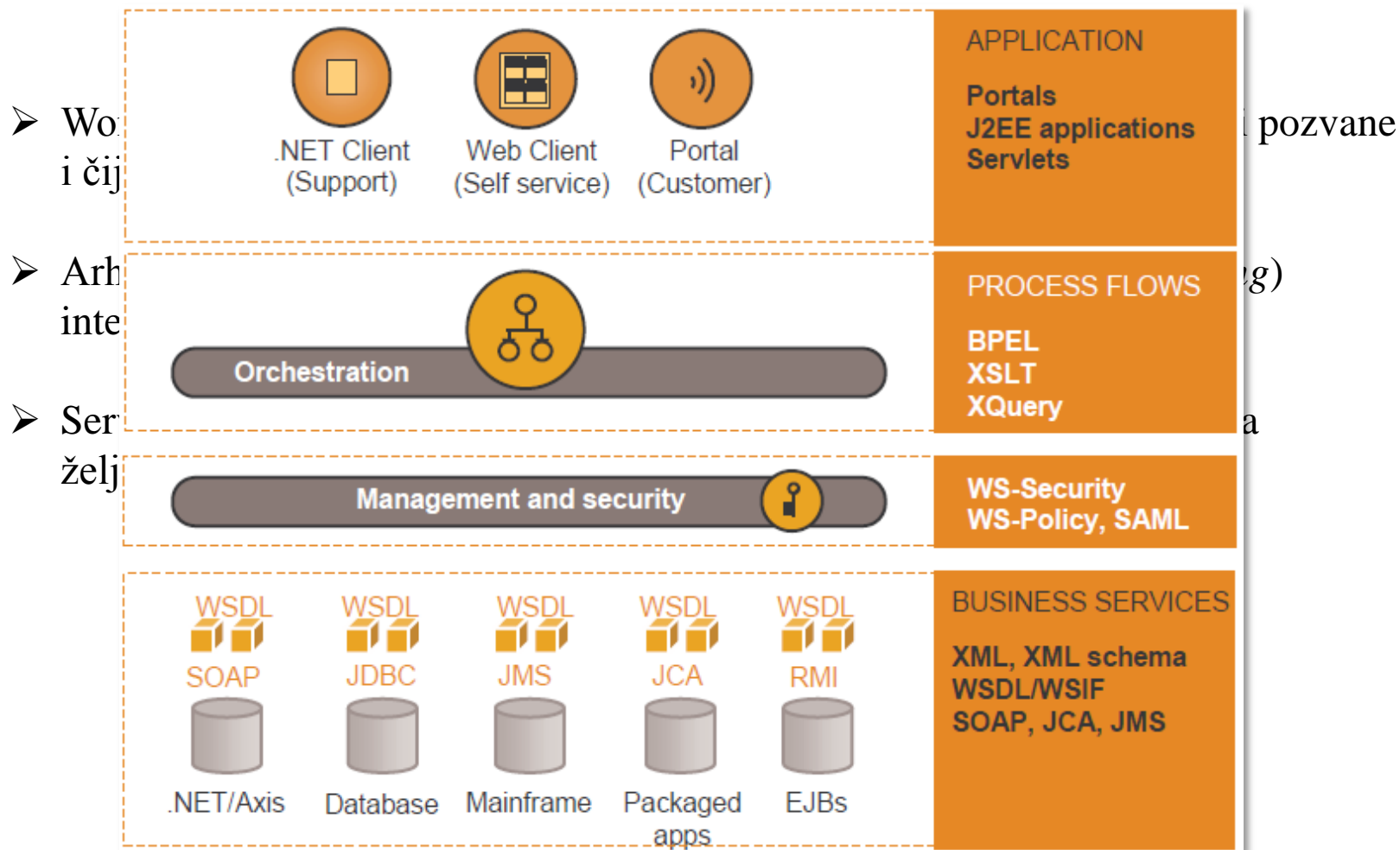
dppk_opsti.prloggresaka(sqlcode
                       , sqlerm
                       , dbms_utility.format_error_backtrace()
                       );

END prpozovibpel;
```

Evolicija arhitekture



Servisno-orijentisana arhitektura



Servisno-orijentisana arhitektura

```
<SOAP-ENV:Envelope>  
  <SOAP-ENV:Body>  
    <GetStockQuote  
      xmlns="urn:stock-quotes" >  
    <StockSymbol>ORCL</StockSymbol>  
    </GetStockQuote>  
  </SOAP-ENV:Body>  
</SOAP-ENV:Envelope>
```

Request

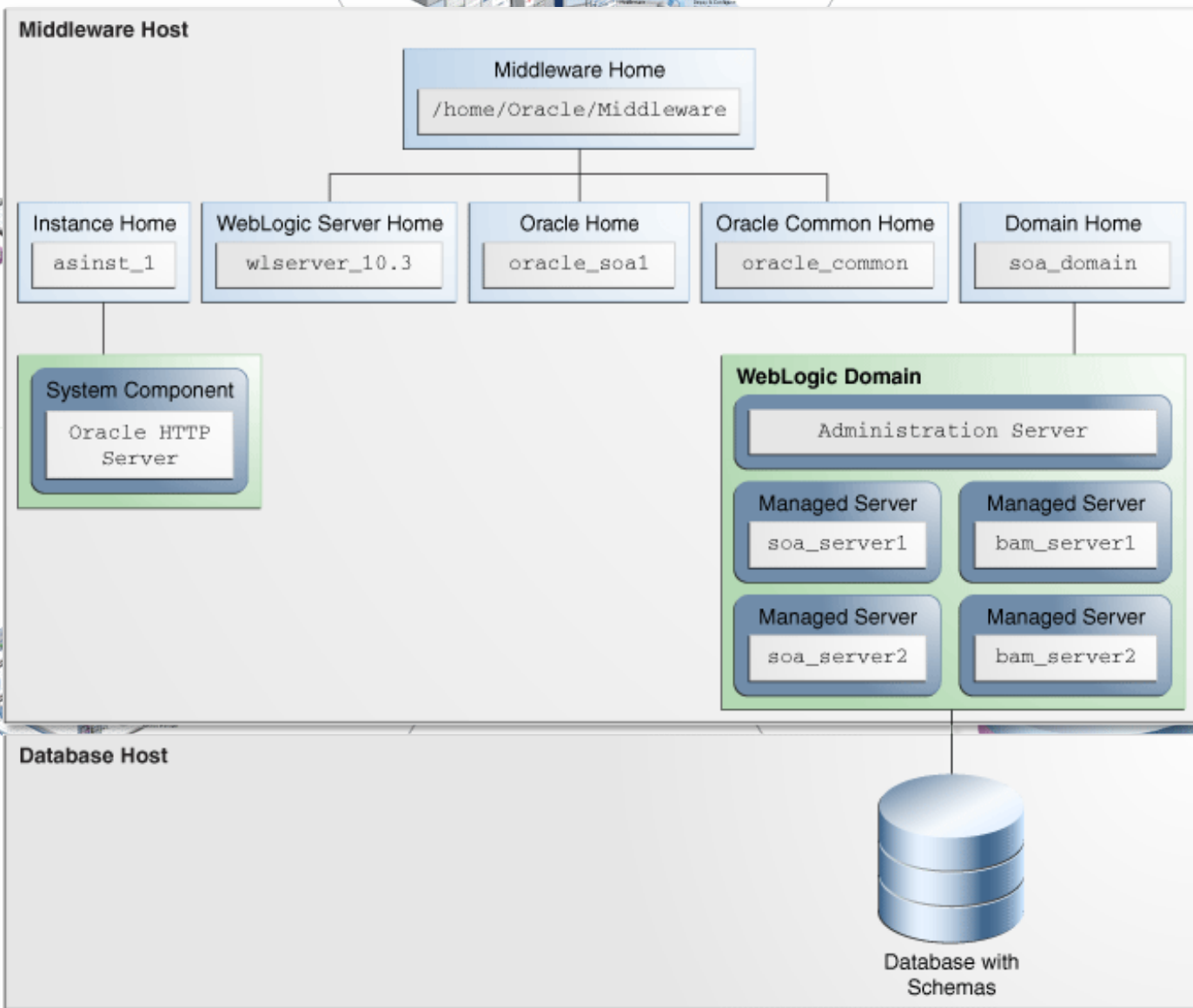
```
<SOAP-ENV:Envelope>  
  <SOAP-ENV:Body>  
    <GetStockQuoteResponse  
      xmlns="urn:stock-quotes" >  
    <USD_Price>15.25</USD_Price>  
    </GetStockQuoteResponse>  
  </SOAP-ENV:Body>  
</SOAP-ENV:Envelope>
```

Response

Business Process Execution Language

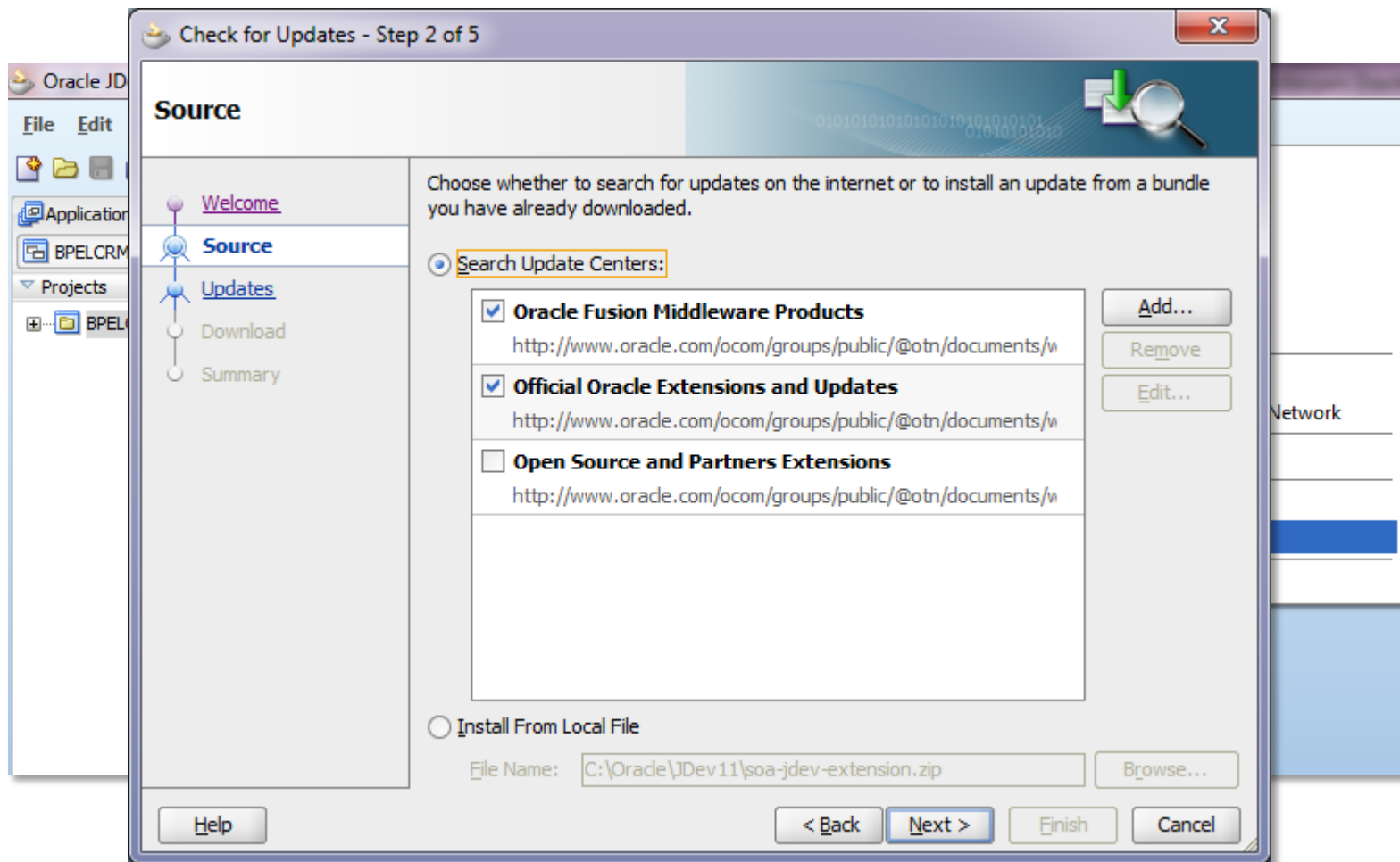
- BPEL je markup jezik za sastavljanje više diskretnih servisa u end-to-end poslovni proces:
 - Workflow jezik
 - Process Flow jezik

- BPEL je XML specifikacija za orkestraciju, dizajniranje procesnog toka i integraciju heterogenih servisa:
 - Web servisa
 - Java servisa
 - DB stored procedura
 - Vendor specifičnih aplikacija (Oracle, SAP, PeopleSoft)



ed

Primjer



Oracle JDeveloper 11g Release 1 - BPELCRMPredmet.jws : BPELCRMPredmet.jpr

Oracle JDeveloper 11g Release 1 - BPELCRMPredmet.jws : BPELCRMPredmet.jpr

File Edit View Application Refactor Search Navigate Build Run Versioning Tools Window Help

Oracle JDeveloper 11g Release 1 - BPELCRMPredmet.jws : BPELCRMPredmet.jpr : C:\Developer\mywork\BPELCRMPredmet\BPELCRMPredmet\BPELCRMPredmet.bpel

File Edit View Application Refactor Search Navigate Build Run Versioning Tools Window Help

Application x Application Server x Database Nav... x BPELCRMPredmet

Projects

- BPELCRMPredmet
 - SOA Content
 - classes
 - testsites
 - xsd
 - xsl
 - Business Rules
 - BPELCRMPredmet_cfplan.xml
 - BPELCRMPredmet.componentType
 - BPELCRMPredmet.wsdl
 - BPELCRMPredmet(composite.xml)
 - fnInformacjePredmetCRM_db_jca
 - fnInformacjePredmetCRM.wsdl

Application Resources

- Connections
- Descriptors

Data Controls

- Recently Opened Files
 - BPELCRMPredmet.bpel
 - Transformation_DISPMDM.xml
 - BPELCRMSynchronizacja.bpel
 - Transformation_1.xsl
 - BPELCRMPredmet_cfplan.xml
 - BPELCRMDMOperationSet_cfplan.xml
 - Transformation_1.xsl
 - BPELCRreiranjeKupca.bpel

Design Source History

BPEL - Log x

BPELCRMPredmet.bpel

BPEL Schema Validator Warnings:

Monitor	Message	Object	Severity
Test			

Errors: 0 Warnings: 0

Validation Search

Messages BPEL x Extensions x

Last Validated On: 11 Oct 2018 12:45:56 GMT

Oracle Extensions

- SOA Components
- BPEL Services

Edit Partner Link

General Image Property Documentation Idempotence

Name: fnInformacjePredmetCRM

Process: BPELCRMPredmet

Initialize Partner Role

WSDL Settings

WSDL URL: fnInformacjePredmetCRM.wsdl

Partner Link Type: fnInformacjePredmetCRM_plt

Partner Role: fnInformacjePredmetCRM_role

My Role: ----- Not Specified -----

Help Apply OK Cancel

Adapter Configuration Wizard - Step 3 of 4

Service Connection

A Database Connection is required to configure this adapter. Select a database connection already defined in your project or create a New Connection.

Connection: T_DISP

User Name: comp

Driver: oracle.jdbc.OracleDriver

Connect String: jdbc:oracle:thin:@//EP-DISP-T3:1521/edisp

Specify the JNDI name for the database. Note: The deployment descriptor of the Database adapter must associate this JNDI name with configuration properties required by the adapter to access the database.

JNDI Name: eis/DB/T_DISP

Help < Back Next > Finish Cancel

Create Database Connection

Configure a new database connection and add it to the current application (BPELCRMPredmet).

Create Connection In: Application Resources IDE Connections

Connection Name: Connection1

Connection Type: Oracle (JDBC)

Username: Role:

Password: Save Password

Oracle (JDBC) Settings

Enter Custom JDBC URL

Driver: thin

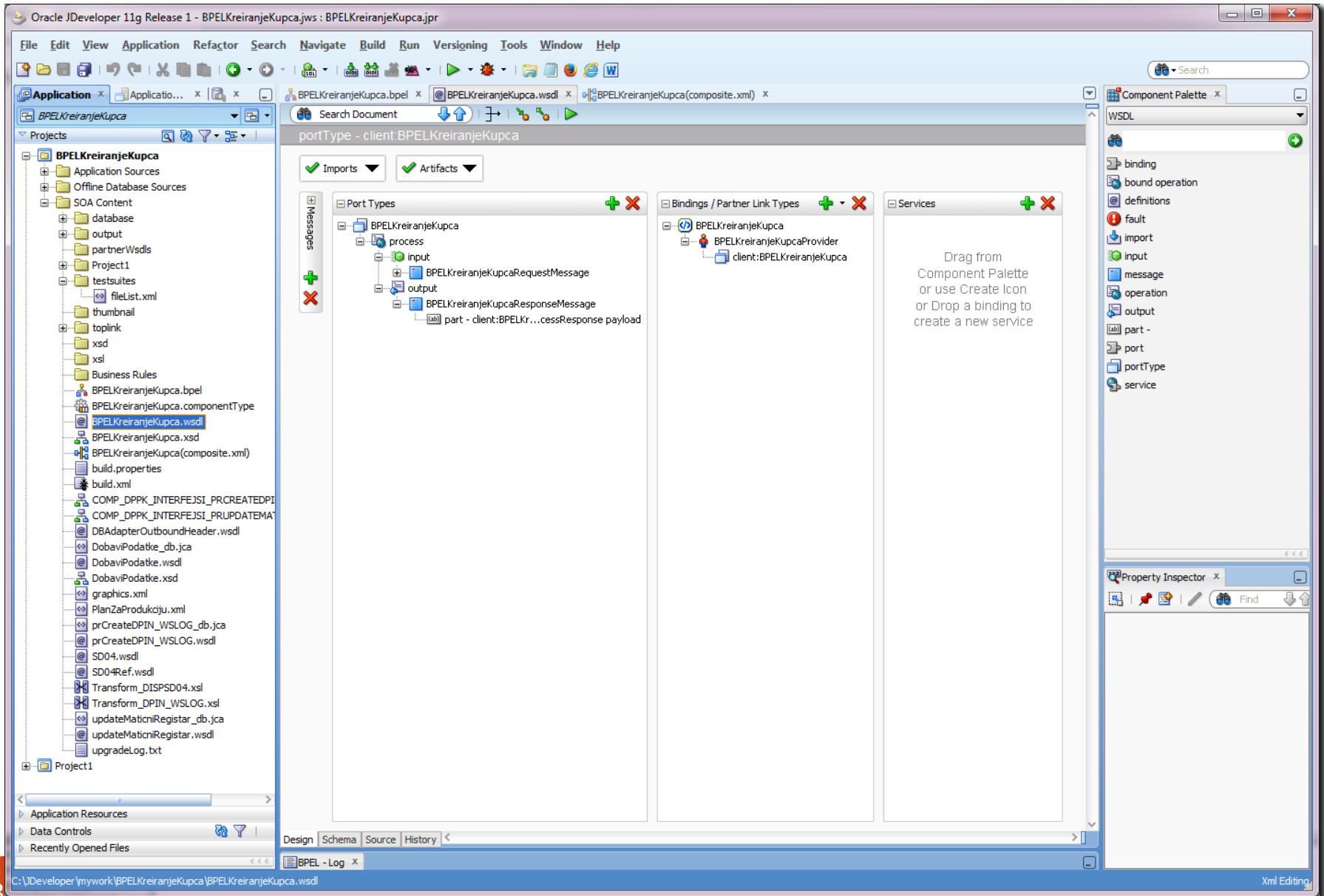
Host Name: localhost JDBC Port: 1521

SID: XE

Service Name: XE

Test Connection

Help OK Cancel



The screenshot displays the Oracle JDeveloper 11g Release 1 IDE interface. The main window shows the configuration for a BPEL process named "portType - client:BPPELkreiranjeKupca". The interface is divided into several panes:

- Project Explorer (Left):** Shows the project structure for "BPPELkreiranjeKupca", including folders like "Application Sources", "Offline Database Sources", "SOA Content", and various files such as "BPELkreiranjeKupca.bpel", "BPELkreiranjeKupca.componentType", and "BPELkreiranjeKupca.wsdl".
- Search Document (Top):** Displays the current document being edited, "portType - client:BPPELkreiranjeKupca".
- Port Types (Middle-Left):** Shows a tree view of port types under "BPPELkreiranjeKupca", including "process", "input" (with "BPPELkreiranjeKupcaRequestMessage"), "output" (with "BPPELkreiranjeKupcaResponseMessage"), and "part - client:BPPELkreiranjeKupca...cessResponse payload".
- Bindings / Partner Link Types (Middle-Right):** Shows a binding for "BPPELkreiranjeKupca" with a partner link type "client:BPPELkreiranjeKupca".
- Services (Right):** A pane for defining services, currently empty with the instruction: "Drag from Component Palette or use Create Icon or Drop a binding to create a new service".
- Component Palette (Far Right):** A palette of WSDL components including "binding", "bound operation", "definitions", "fault", "import", "input", "message", "operation", "output", "part", "port", "portType", and "service".
- Property Inspector (Bottom Right):** A pane for inspecting properties, currently empty.

The status bar at the bottom indicates the current document is "BPEL - Log" and the editor is in "Xml Editing" mode. The file path shown is "C:\Developer\mywork\BPPELkreiranjeKupca\BPPELkreiranjeKupca.wsdl".

Source: DobaviPodatke.xsd

Expression Builder

Build an expression by typing directly into the Expression field, using Ctrl+Space for XPath assistance, and/or insert fragments from the fragment editors below the Expression field.

Expression:

```
concat('Za ID: ', $inputVariable.payload/client:input, ' podaci nisu proslidjeni SAP-u zbog greske pri pozivu servisa (servis za dohvat podataka ili SAP Web Servis - pogledati BPEL instancu, ID: ', ora:getInstanceId(), ')')
```

Insert Into Expression

BPEL Variables

- Process
 - inputVariable client:BPELkreiranjeKupcaRequestMe
 - outputVariable client:BPELkreiranjeKupcaResponse
 - Invoke_DobaviPodatke_DobaviPodatke_InputVarie
 - Invoke_DobaviPodatke_DobaviPodatke_OutputVar
 - Invoke_DISP5D04_ZRfcCmdEIMaintainBapi_InputV
 - Invoke_DISP5D04_ZRfcCmdEIMaintainBapi_Output
 - Invoke_updateMaticni_updateMaticni_InputVariabl
 - Invoke_updateMaticni_updateMaticni_OutputVaria

Functions

Advanced Functions

- addQuotes
- copyList
- create-nodeset-from-delimited-string
- createDelimitedString
- doStreamingTranslate
- doTranslateFromNative
- doTranslateToNative

Content Preview:

```
ora:addQuotes()
```

Description:

This function returns content of xstring in single quotes. The signature of this function is ora:addQuotes(string).

Help OK Cancel

XSLT File: SD04.wsdl

<target>

CentralData

- Ktold
- Name
- Street
- PostlCod1
- City
- Country
- Langu
- Stcd1
- Stcd3
- Stkzn
- Stkzu
- Taxkd

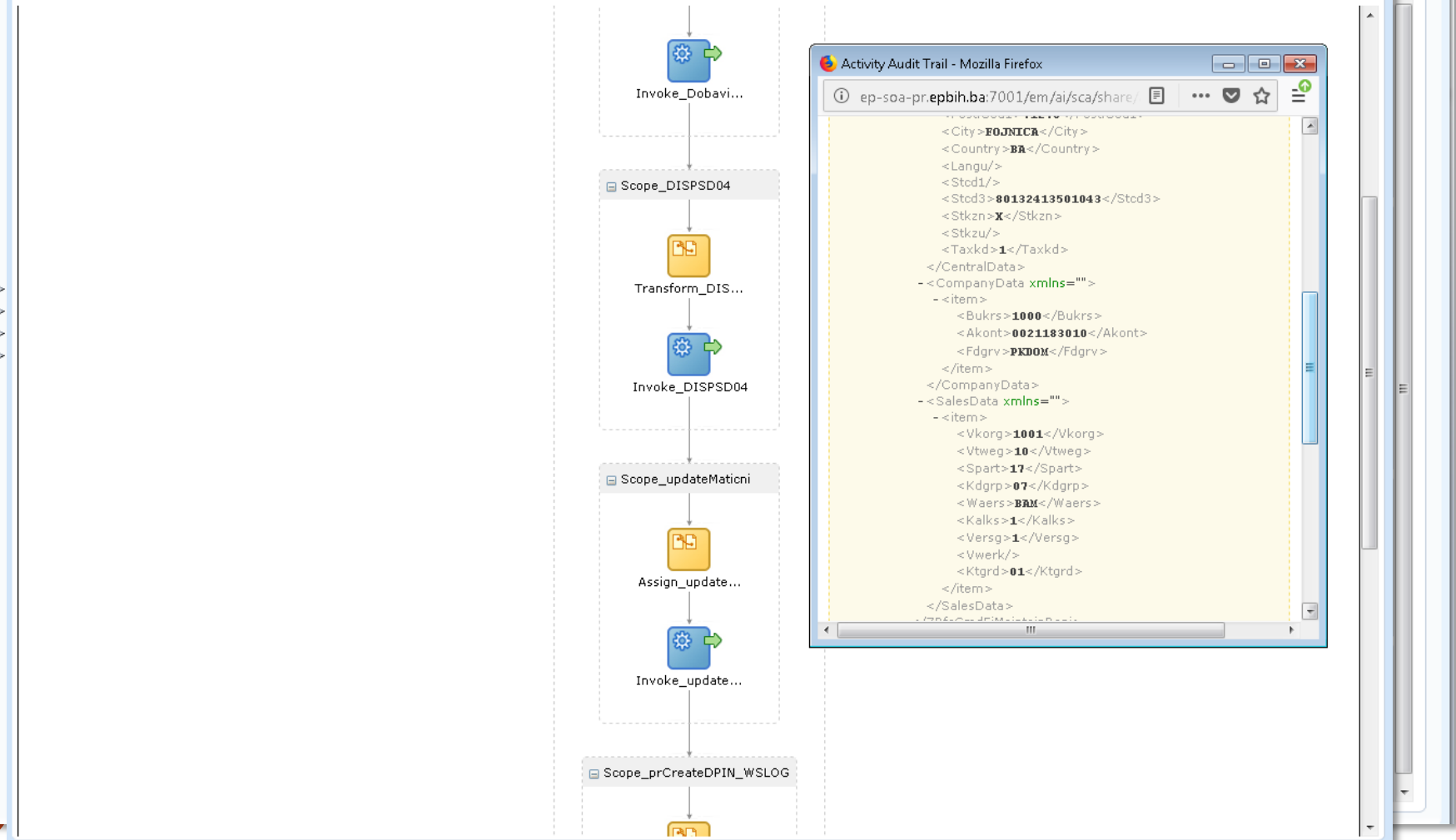
CompanyData

- for-each
- item
- Bukrs
- Akont
- Fdgrv

CustomerNoUpd

- SalesData
- for-each
- item
- Vkorg
- Vtweg
- Spart
- Kdgrp
- Waers
- Kalks
- Versg
- Vwerk
- Ktgrd

Design Source History



Activity Audit Trail - Mozilla Firefox

```
<City>FOJNICA</City>
<Country>BA</Country>
<Langu/>
<Stod1/>
<Stod3>80132413501043</Stod3>
<Stkzn>X</Stkzn>
<Stkzu/>
<Taxkd>1</Taxkd>
</CentralData>
<CompanyData xmlns="">
  <item>
    <Bukrs>1000</Bukrs>
    <Akont>0021183010</Akont>
    <Fdgrv>PKD0M</Fdgrv>
  </item>
</CompanyData>
<SalesData xmlns="">
  <item>
    <Vkgorg>1001</Vkgorg>
    <Vtweg>10</Vtweg>
    <Spart>17</Spart>
    <Kdgrp>07</Kdgrp>
    <Waers>BAM</Waers>
    <Kalks>1</Kalks>
    <Versg>1</Versg>
    <Vwerk/>
    <Ktgrd>01</Ktgrd>
  </item>
</SalesData>
```

Umjesto zaključka

- Sve veća heterogenost informacionog sistema ga čini teško upravljivim.
- Potreba za integracijom poslovnih aplikacionih sistema (EAI) je konstantna i stalno se povećava.
- Uspostavljanje kvalitetnog modela integracije može umnogome olakšati upravljanje sistemom i dostupnost informacijama.
- Za kvalitetno upravljanje integracijama potrebno je široko znanje o konceptima i tehnologijama.
- SOA Suite je platforma koja zadovoljava postojeće potrebe za integracijom u prikazanom primjeru informacionog sistema.

Izvori

- Oracle Help Center (docs.oracle.com):
 - Oracle Database JPublisher User's Guide 11g Release 2 (11.2), Oracle, 2009
 - Oracle Fusion Middleware Concepts Guide, 11g Release 1 (11.1.1.0.0), Oracle, 2009
 - Oracle BPEL Process Manager Order Booking Tutorial, Oracle, 2005

- Oracle DB as Web Service Client, Ermin Prašović, Oracle, 2010

- Distribuirani IS za priključenje kupaca na ED mrežu (DISP), Jasmin Heljić, Omer Gegić, Emina Kreštalica, HrOUG, 2013

- Javna poduzeća, Financijska praksa, 17 (1), 1993, 91-93, Marina Kesner-Škreb