

Migrating to MultiTenancy

Timothy D. Kuehn

Senior OpenEdge Consultant

TDK Consulting Services Inc



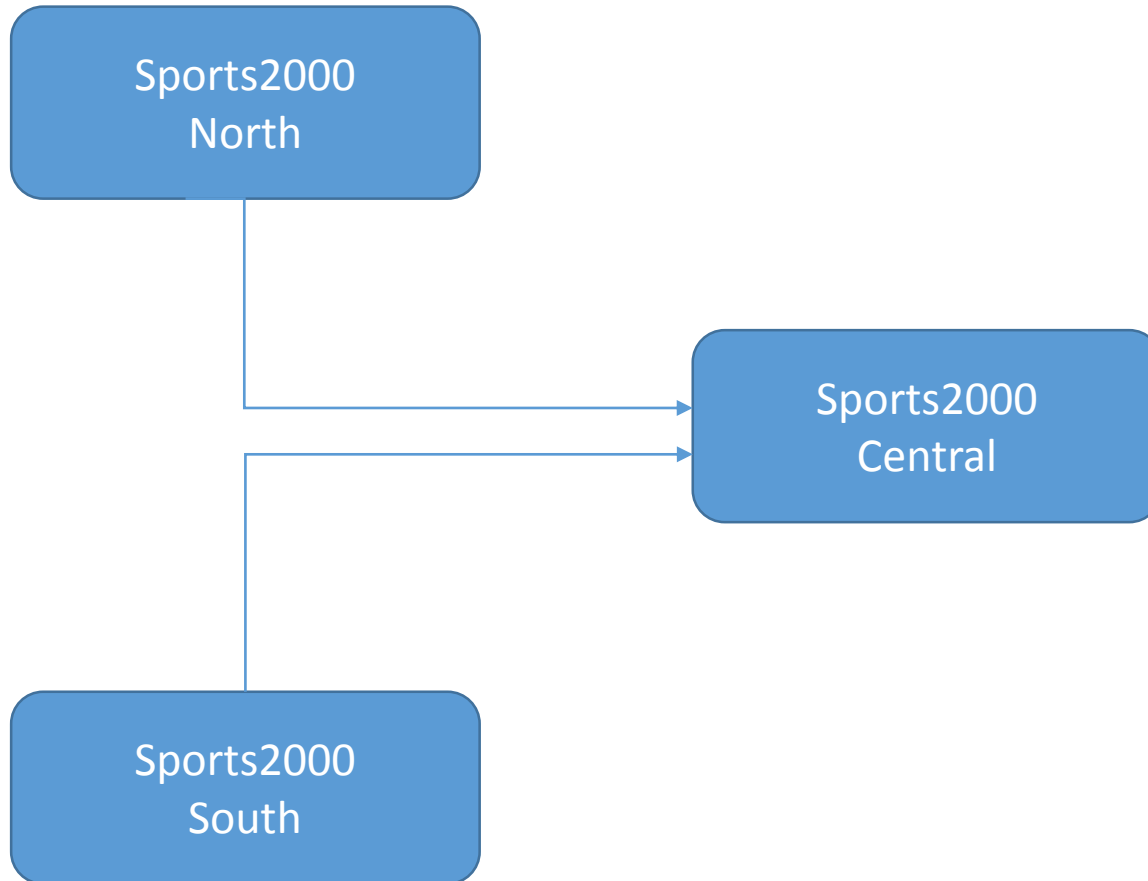
timk@tdkcs.ca tim.kuehn@gmail.com

Ph 519-576-8100 Cell: 519-781-0081

Migrating to MultiTenancy

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The Assignment – Merge “North” and “South” into one DB



How to make the transition?

Two Options:

Create a new MT DB

Convert an existing DB to MT

Convert an existing DB, or Start from Scratch?

Convert an existing DB to MT

- Requires all MT DB objects be in a Type II area
- (default indexes too!)
- Enable tables for MT
- Delete and create sequences for MT
- Create Tenants, Domains, and Users
- Copy tenant's data from default partition to their MT Tenant partition
- Delete default tenant partition data
- Load other tenant's data and sequences
- Configure user login sequence

Convert an existing DB, or Start from Scratch?

Start from Scratch

- Create new db with Type II Areas
- Edit .df to set tables and sequences to be MT
- Load .df
- Create Tenants, Domains, and Users
- Load data and sequences for each MT Tenant
- Configure user login process

Elements needed to make a MT DB:

.st file with all Type II Storage Areas

.df file converted to MT

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Convert .st file to Type II storage areas:

Original .st

```
b .
d "Schema Area":6,32;1 .

d "Employee":7,32;1 .
d "Inventory":8,32;1 .
d "Cust_Data":9,32;1 .
d "Cust_Index":10,32;1 .
d "Order":11,32;1 .
d "Misc":12,32;1 .
```



1 block / cluster = Type I area

.st Converted to Type II Areas

```
b .
d "Schema Area":6,32;1 .

d "Employee":7,32;8 .
d "Inventory":8,32;8 .
d "Cust_Data":9,32;8 .
d "Cust_Index":10,32;8 .
d "Order":11,32;8 .
d "Misc":12,32;8 .
```



> 1 block / cluster = Type II Area

Convert DF Table to MT

Before MT

```
ADD TABLE "Family"  
  AREA "Employee"  
  DUMP-NAME "family"
```

With MT

```
ADD TABLE "Family"  
  MULTITENANT yes  
  AREA "Employee"  
  DUMP-NAME "family"
```


Convert DF Sequence to MT

Before MT

```
ADD SEQUENCE "NextCustNum"  
  INITIAL 1000  
  INCREMENT 5  
  CYCLE-ON-LIMIT no  
  MIN-VAL 1000
```

With MT

```
ADD SEQUENCE "NextCustNum"  
  MULTITENANT yes  
  INITIAL 1000  
  INCREMENT 5  
  CYCLE-ON-LIMIT no  
  MIN-VAL 1000
```

Create an empty MT DB

```
D:\MT\central\db\prodb sports2000
```

```
Please enter
```

```
demo to get the system demonstration database, or
```

```
sports to get the sports demonstration database, or
```

```
isports to get the international sports database, or
```

```
sports2000 to get the sports2000 sample database, or
```

```
empty to get the system empty database, or
```

```
anyname to get a copy of that database. : empty
```

```
Procopy session begin for tdk on CON:. (451)
```

```
Database copied from c:\progress\openedge\11.1\empty. (1365)
```

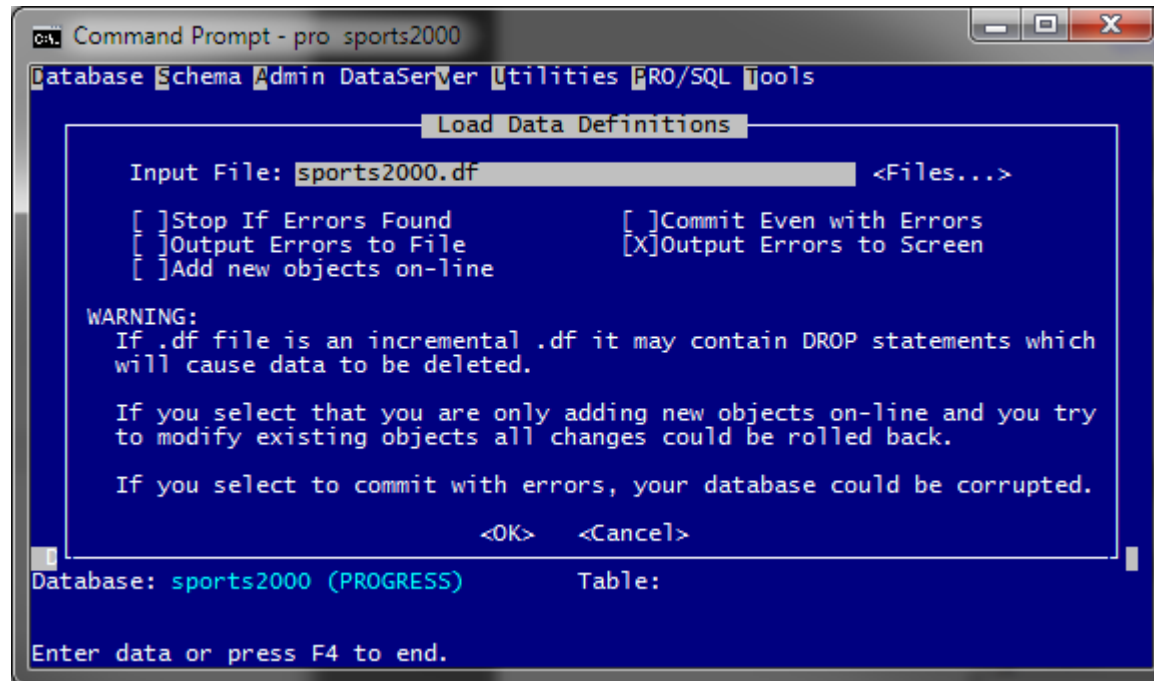
```
Procopy session end. (334)
```

```
D:\MT\central\db\proutil sports2000 -C enableMultitenancy
```

```
OpenEdge Release 11.1 as of Fri Jun 15 19:01:20 EDT 2012
```

```
Multi-tenant Tables has been successfully enabled. (15900)
```

Load the MT df file



```
cmd Command Prompt - pro sports2000
Database Schema Admin DataServer Utilities PRO/SQL Tools
Load Data Definitions
Input File: sports2000.df <Files...>
[ ] Stop If Errors Found          [ ] Commit Even with Errors
[ ] Output Errors to File        [X] Output Errors to Screen
[ ] Add new objects on-line

WARNING:
If .df file is an incremental .df it may contain DROP statements which
will cause data to be deleted.

If you select that you are only adding new objects on-line and you try
to modify existing objects all changes could be rolled back.

If you select to commit with errors, your database could be corrupted.

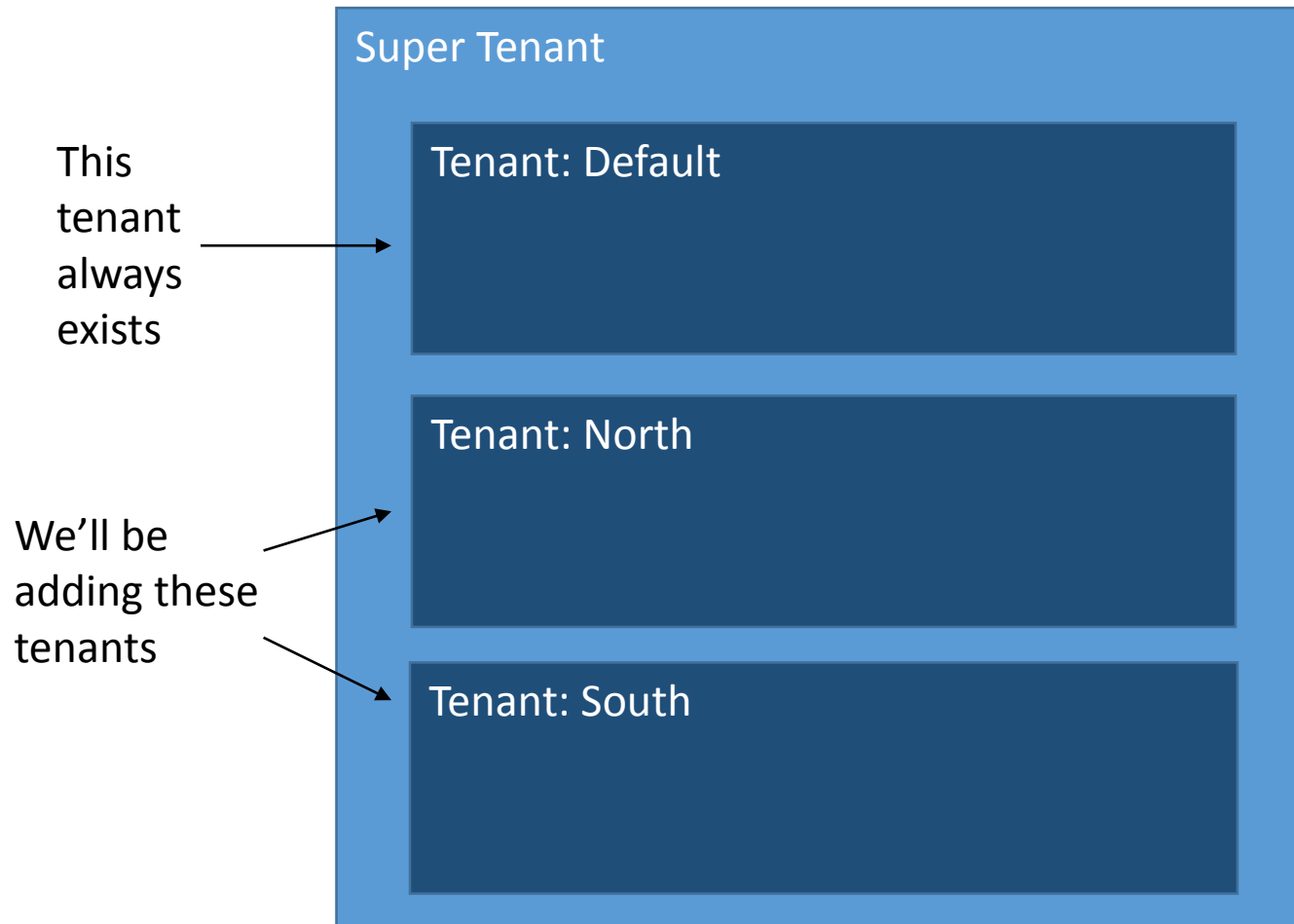
<OK> <Cancel>
Database: sports2000 (PROGRESS) Table:
Enter data or press F4 to end.
```

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Setting up tenants, domains, and users

Segregation and Visibility of Tenant Data



Configure tenants, domains, and users

Tenant: North

Domain: Personnel.north.s2k.com

User: cashier
User: shipping

Domain: Manager.north.s2k.com

User: day
User: night

Domain: audit.north.s2k.com

User: auditor

Who and what goes where

cashier@personnel.north.s2k.com
shipping@personnel.north.s2k.com

day@manager.north.s2k.com
night@manager.north.s2k.com

auditor@audit.north.s2k.com

Setting up tenants, domains, and users – Configuring Tenants

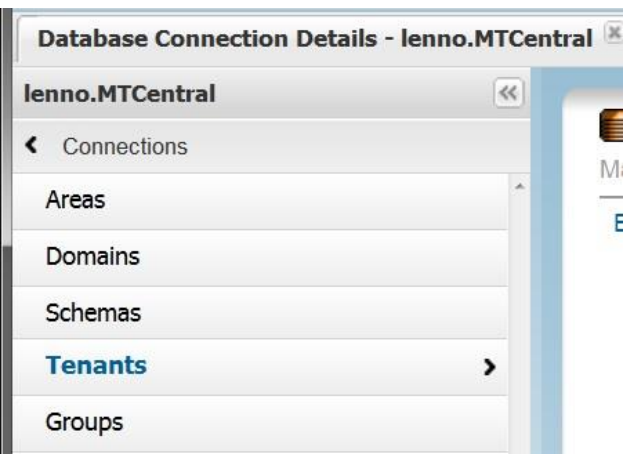
Options for setting up and configuring a (new) tenant:

- Data Admin Tool – Can create / maintain almost everything but tenants
- API – use to automate MT administration (outside scope of this presentation)
- OE Explorer

Migrating to MultiTenancy

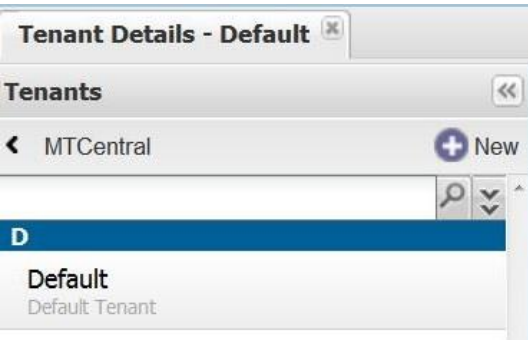
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Setting up tenants, domains, and users – Creating Tenants



← OE Explorer main screen

← Maintain Tenants



← Make a new tenant

Setting up tenants, domains, and users – Creating Tenants

Database Connection Details - lenno.MTCentral | **Create Tenant**

Tenant name:

Description:

External ID:

Tenant type: Regular Super

Enable data access:

Database connection:

Default data area:

Default index area:

Default LOB area:

Object allocation rule: Set new objects not to allocate space
 Set new objects to allocate space on tenant creation
 Set new objects to delay space allocation

Copy default from: Do not use template
 Tenant
 Template

Tenant Name

Regular or Super Tenant

Is the tenant allowed access

Where to store new db objects

New db object allocation policy

Setting up tenants, domains, and users – Creating Tenants

Database Connection Details - lenno.MTCentral | **Create Tenant**

Tenant name:

Description:

External ID:

Tenant type: Regular Super

Enable data access:

Database connection:

Default data area:

Default index area:

Default LOB area:

Object allocation rule: Set new objects not to allocate space
 Set new objects to allocate space on tenant creation
 Set new objects to delay space allocation

Copy default from: Do not use template
 Tenant
 Template

Tenant Name

Regular or Super Tenant

Is the tenant allowed access

Where to store new db objects

New db object allocation policy

How to create the tenant

Setting up tenants, domains, and users – Creating Super Tenants

Database Connection Details - lenno.MTCentral | Create Tenant

Tenant name: SuperTenant

Description: Super Tenant

External ID:

Tenant type: Regular Super

Enable data access:

Database connection: lenno.MTCentral

Default data area: --None--

Default index area: --None--

Default LOB area: --None--

Object allocation rule:

- Set new objects not to allocate space
- Set new objects to allocate space on tenant creation
- Set new objects to delay space allocation

Copy default from:

- Do not use template
- Tenant
- Template --None--

? Create tenant Generate tenant program

Tenant Name

Regular or Super Tenant

Is the tenant allowed access

How to create the tenant

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Setting up tenants, domains, and users – Creating Domains

The screenshot shows a web application interface for managing tenants. On the left, there is a sidebar titled "Tenants" with a search bar and a list of tenants: "Default", "North", "South", and "SuperTenant". The "North" tenant is selected. The main content area is titled "Manage Tenant" and contains the following options: "Edit tenant", "Delete tenant", "Tenant data access: enabled", and "Generate tenant program". An arrow points from the text on the right to the "Edit tenant" option.

Have to Edit a
Tenant in order to
add (a) Domain(s)

Setting up tenants, domains, and users – Creating Domains

The screenshot shows the Oracle MultiTenancy Administration console. On the left, a 'Tenants' sidebar lists 'Default', 'North', 'South', and 'SuperTenant'. The 'North' tenant is selected. The main area shows the 'General' tab for the 'North' tenant configuration. The configuration includes:

- Tenant name: North
- Tenant type: Regular
- Description: Northern Sports2000 store
- External ID: (empty)
- Tenant data access:
- Database connection: lenno.MTCentral
- Default data area: Misc
- Default index area: Misc
- Default LOB area: Misc
- Object allocation rule: Set new objects to allocate space immediately
- Is allocated

Click To Edit Domain



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Setting up tenants, domains, and users – Creating Domains

Make a New Domain

Domain.tenant

How a user is authenticated

Access code – used when creating CP objects

Is this domain active?

Commit Cancel New Delete

Domain name: <Search>

Name	Authentication System	Enabled
No domains to display		

Page 1 of 1

Domain name:

Authentication system:

Access code:

Confirm access code:

Description:

Comments:

Enabled

Auditing context:

Runtime options:

System options:

Setting up tenants, domains, and users – Creating Domains

The screenshot shows a web application interface for managing tenants and domains. On the left, a sidebar titled 'Tenants' lists several tenants: 'Default' (Default Tenant), 'North' (Northern Sports2000 store), 'South' (Southern Tenant), and 'SuperTenant' (Super Tenant). The 'North' tenant is currently selected. The main content area has a top navigation menu with 'Domains' highlighted. Below the menu, there are buttons for 'Commit', 'Cancel', 'New', and 'Delete'. A search bar for 'Domain name' is present. A table displays the existing domains:

Name	Authentication System	Enabled
personnel.north.s2k.com	_ousercontent	true

Below the table, a form for creating a new domain is visible. The 'Domain name' field contains 'personnel.north.s2k.com'. The 'Authentication system' dropdown is set to '_ousercontent'. The 'Access code' field contains '_extsso', and the 'Confirm access code' field contains '_ousercontent'. The 'Description' field is empty. The 'Enabled' checkbox is checked. The 'Auditing context' field is empty. The 'Runtime options' and 'System options' fields are also empty.

“Commit”
when done

How to
authenticate
a user

Setting up tenants, domains, and users – Creating Domains

The screenshot shows a web application interface for managing tenants and domains. On the left, there is a sidebar titled "Tenant Details - North" with a "Tenants" section. The "Tenants" section lists several tenants: "Default" (Default Tenant), "North" (Northern Sports2000 store), "South" (Southern Tenant), and "SuperTenant" (Super Tenant). The "North" tenant is selected. The main area is titled "Domains" and shows a table of domains. The table has columns for "Name", "Authentication System", and "Enabled". One domain is listed: "personnel.north.s2k.com" with authentication system "_oeusertable" and enabled status "true". Below the table is a form for creating a new domain. The form fields are: "Domain name" (personnel.north.s2k.com), "Authentication system" (_oeusertable), "Access code" (masked with dots), "Confirm access code" (masked with dots), "Description" (empty), "Comments" (empty), "Auditing context" (empty), "Runtime options" (empty), and "System options" (empty). The "Enabled" checkbox is checked.

Name	Authentication System	Enabled
personnel.north.s2k.com	_oeusertable	true

Domain name: personnel.north.s2k.com
Authentication system: _oeusertable
Access code:
Confirm access code:
Description:
Comments:
Auditing context: Enabled
Runtime options:
System options:

How things look after the "personnel" domain's been added

Setting up tenants, domains, and users – Creating Domains

Tenant Details - North

Tenants

- MTCentral
- Default (Default Tenant)
- North (Northern Sports2000 store)
- South (Southern Tenant)
- SuperTenant (Super Tenant)

General

Partitions

Groups

Users

Domains

Commit Cancel New Delete

Domain name: <Search>

Name	Authentication System	Enabled
audit.north.s2k.com	_ousercontent	true
manager.north.s2k.com	_ousercontent	true
personnel.north.s2k.com	_ousercontent	true

Page 1 of 1 | Displaying domain 1 - 3 of 3

Domain name: audit.north.s2k.com

Authentication system: _ousercontent

Access code:

Confirm access code:

Description:

Comments:

Enabled

Auditing context:

Runtime options:

System options:

And how they look after all the “north” domains have been added

Setting up tenants, domains, and users – Creating Users

Tenant Details - North

Tenants

- MTCentral
- Default (Default Tenant)
- North (Northern Sports2000 store)
- South (Southern Tenant)
- SuperTenant (Super Tenant)

General

Partitions

Groups

Users

Domains

Commit Cancel New Delete

Domain name: <Search>

Name	Authentication System	Enabled
audit.north.s2k.com	_ousercontent	true
manager.north.s2k.com	_ousercontent	true
personnel.north.s2k.com	_ousercontent	true

Page 1 of 1 | Displaying domain 1 - 3 of 3

Domain name: audit.north.s2k.com

Authentication system: _ousercontent

Access code:

Confirm access code:

Description:

Comments:

Enabled

Auditing context:

Runtime options:

System options:

Click to
add users

Setting up tenants, domains, and users – Creating Users

Tenant Details - North

Tenants

- MTCentral
- Default (Default Tenant)
- North (Northern Sports2000 store)
- South (Southern Tenant)
- SuperTenant (Super Tenant)

General

Partitions

Groups

Users

Domains

Commit Cancel **New** Delete

User name: <Search>

User ID	User Name	Domain Name	SQL Only	Description
No users to display				

Page 1 of 1

User ID: [input]

User name: [input]

Domain name: --None--

Password: [input]

Confirm password: [input]

SQL Only

Description: [input]

Given name: [input]

Middle initial: [input]

Surname: [input]

Telephone: [input]

E-mail: [input]

Create a blank new user

ID for user

Name

Domain

Password

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Setting up tenants, domains, and users – Creating Users

Tenant Details - North

Tenants

- MTCentral
- Default (Default Tenant)
- North (Northern Sports2000 store)
- South (Southern Tenant)
- SuperTenant (Super Tenant)

- General
- Partitions
- Groups
- Users**
- Domains

Commit Cancel New Delete

User name: <Search>

User ID	User Name	Domain Name	SQL Only	Description
cashier@personnel.north.s2k...	cashier	personnel.north.s2k.com		

Page 1 of 1

No users to display

User ID: cashier@personnel.north.s2k.com

User name: cashier

Domain name: personnel.north.s2k.com

Password: ●●●●●●

Confirm password: ●●●●●●

SQL Only

Description:

Given name: Front Desk

Middle initial:

Surname:

Telephone:

E-mail: cashier@north.s2k.com

Commit new user

ID for user

Name

Domain

Password

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Setting up tenants, domains, and users – Creating Users

The screenshot shows a web application interface for managing users in a multi-tenant system. On the left, there is a sidebar with a 'Tenants' list containing 'Default', 'North', 'South', and 'SuperTenant'. The 'North' tenant is selected. The main area has a navigation menu with 'General', 'Partitions', 'Groups', 'Users', and 'Domains'. The 'Users' section is active, displaying a table of users and a form for creating a new user.

User ID	User Name	Domain Name	SQL Only	Description
auditor@audit.north.s2k.com	auditor	audit.north.s2k.com	false	
cashier@personnel.north.s2k.com	cashier	personnel.north.s2k.com	false	
day@manager.north.s2k.com	day	manager.north.s2k.com	false	
night@manager.north.s2k.com	night	manager.north.s2k.com	false	
shipping@personnel.north.s2k.com	shipping	personnel.north.s2k.com	false	

The form below the table includes fields for: User ID, User name, Domain name, Password, Confirm password, SQL Only (checkbox), Description, Given name, Middle initial, Surname, Telephone, and E-mail.

How things look after all the "north" users have been added

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MT Tenant - Final Configuration

Tenant: North

Domain: Personnel.north.s2k.com

cashier
shipping

Domain: Manager.north.s2k.com

night
day

Domain: audit.north.s2k.com

auditor

Tenant: South

Domain: Personnel.south.s2k.com

cashier
shipping

Domain: Manager.south.s2k.com

night
day

Domain: audit.south.s2k.com

auditor

Default Tenant

Tenants need their data....

Loading the Tenant Data

```
D:\test\MT\central\db>mpro sports2000 -U superuser@superdomain.s2k.com -P password
```

- Go to the Data Admin Tool
- Admin->Load->Table Contents
- Select all tables to load

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Loading the Tenant Data

```

c:\> Command Prompt - mpro_sports2000 -U superuser@superdomain.s2k.com -P pa...
Database Schema Admin DataServer Utilities PRO/SQL Tools

Load Data Contents for All Tables

Effective Tenant: Default <Select Tenant...>
Use Default Location: [X] (Tenant data and lobs in subdirectories)
Shared Directory:
Tenant Directory: Default
Include LOB: [X]
Tenant LOB Directory: Default/lobs

Specify an acceptable error percentage. When this limit is reached,
loading will stop. Enter 0 if any error should stop the load; enter
100 if the load should not stop for any error.

Acceptable Error Percentage:
[ ]Output Errors to Screen

<OK> <Cancel>

Enter data or press F4 to end.
  
```

```

c:\> Command Prompt - mpro_sports2000 -U superuser@superdomain.s2k.com -P pa...
Database Schema Admin DataServer Utilities PRO/SQL Tools

Load Data Contents for All Tables

Effective Tenant: Default <Select Tenant...>
Select Tenant
Name          Id ExternalId      Type
-----
Default       0
North         1 ?                Regular
South         2 ?                Regular

< OK > < Cancel >

Enter data or press F4 to end.
  
```

```

c:\> Command Prompt - mpro_sports2000 -U superuser@superdomain.s2k.com -P pa...
Database Schema Admin DataServer Utilities PRO/SQL Tools

Load Data Contents for All Tables

Effective Tenant: North <Select Tenant...>
Use Default Location: [X] (Tenant data and lobs in subdirectories)
Shared Directory: d:\test\mt\
Tenant Directory: d:\test\mt\North
Include LOB: [X]
Tenant LOB Directory: d:\test\mt\North\lobs

Specify an acceptable error percentage. When this limit is reached,
loading will stop. Enter 0 if any error should stop the load; enter
100 if the load should not stop for any error.

Acceptable Error Percentage:
[ ]Output Errors to Screen

<OK> <Cancel>

Leave blank for current directory
  
```


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Loading the Tenant Data

```

c:\> Command Prompt - mpro sports2000 -U superuser@superdomain.s2k.com -P pa...
File Edit Search Buffer Compile Tools Help
set-effective-tenant("north").
For each customer no-lock:
  display customer.name with down.
end.
- File: Untitled:1
F1=RUN F3=MENUS F5=OPEN F6=SAVE F8=CLOSE Insert

c:\> Command Prompt - mpro sports2000 -U superuser@superdomain.s2k.com -P pa...
Name
Lift Tours north
Urpon Frisbee north
Hoops north
Go Fishing Ltd north
Match Point Tennis north
Fanatical Athletes north
Aerobics valine Ky north
Game Set Match north
Pihitiputaan Pyora north
Just Joggers Limited north
Keilailu ja Biljardi north
Surf Lautaveikkoset north
Biljardi ja tennis north
Paris St Germain north
Hoopla Basketball north
Thundering Surf Inc. north
High Tide Sailing north
Antin Metsastysase north
Press space bar to continue.
  
```

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Loading the Tenant Data

The image shows two side-by-side screenshots of a Windows Command Prompt window. The title bar for both windows reads "Command Prompt - mpro sports2000 -U superuser@superdomain.s2k.com -P pa...".

The left window shows a script being executed. The script content is as follows:

```

File Edit Search Buffer Compile Tools Help
set-effective-tenant("south").
for each customer no-lock:
  display customer.name with down.
end.
File: Untitled:1
F1=RUN F3=MENUS F5=OPEN F6=SAVE F8=CLOSE Insert

```

The right window shows the output of the script. The output is a list of customer names, each followed by the tenant name "south". The output is enclosed in a white-bordered box. Below the box, the text "Press space bar to continue." is visible.

```

Name
Lift Tours south
Urpon Frisbee south
Hoops south
Go Fishing Ltd south
Match Point Tennis south
Fanatical Athletes south
Aerobics valine Ky south
Game Set Match south
Pihtiputaan Pyora south
Just Joggers Limited south
Keilailu ja Biljardi south
Surf Lautaveikkoset south
Biljardi ja tennis south
Paris St Germain south
Hoopla Basketball south
Thundering Surf Inc. south
High Tide Sailing south
Antin Metsastysase south
Press space bar to continue.

```

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TDK
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And there was great celebration!



Until someone asked about the elephant in the room...

What about
appservers?



What about
webservices?



Client Principal to the Rescue!

Client-Principal: A security token containing trusted user credentials that establish user identity for an ABL session and database connection(s).



Types of CP objects:

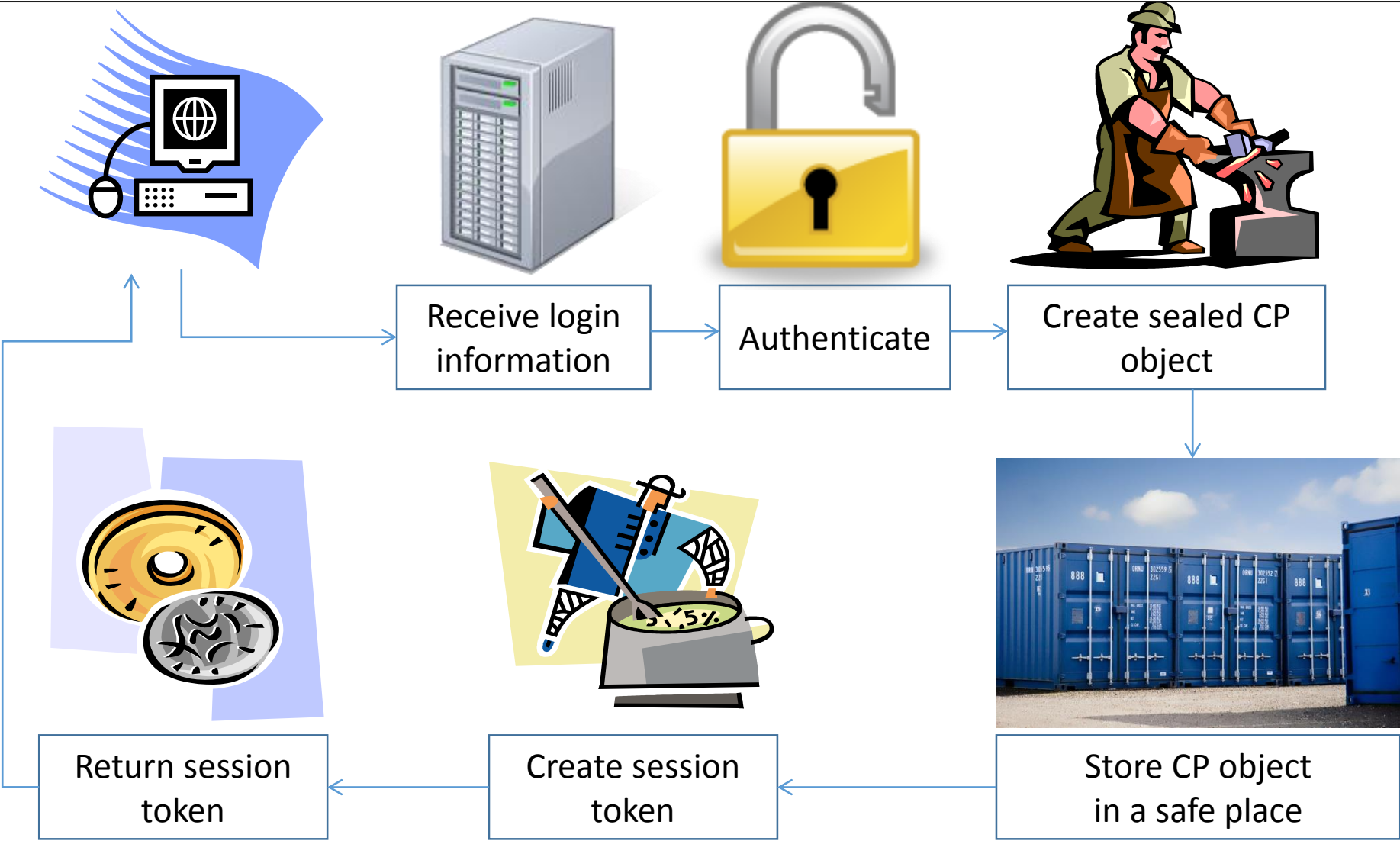
Type	Description
Unsealed	The CP object information has not been authenticated and can be changed. (See the "LOGIN-STATE" attribute for more details)
Sealed	CP object values have been set to authenticate access to the user@domain's tenant, then converted to a tamper-proof token that can't be changed.



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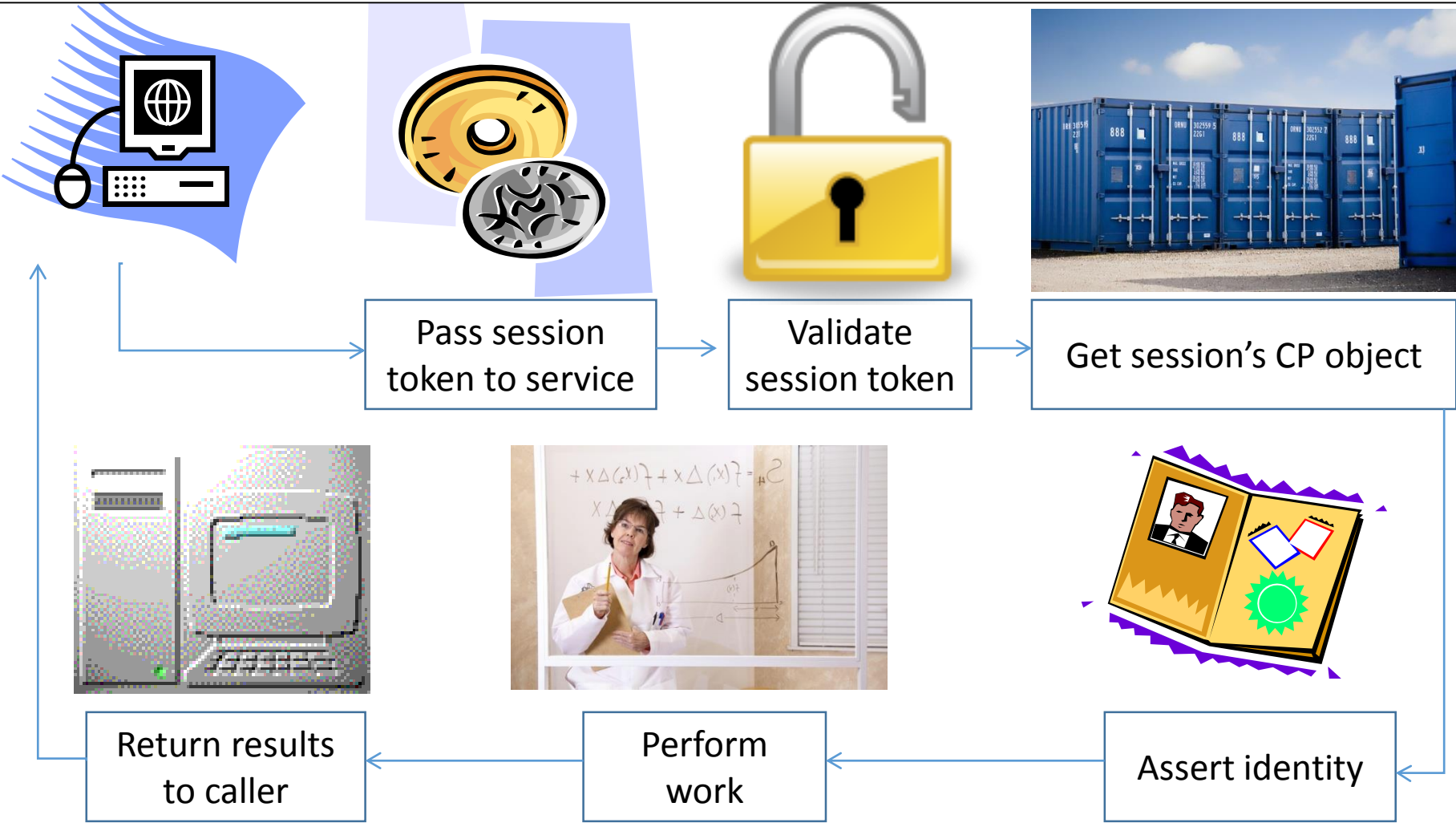
Client Principal – Establishing a Session



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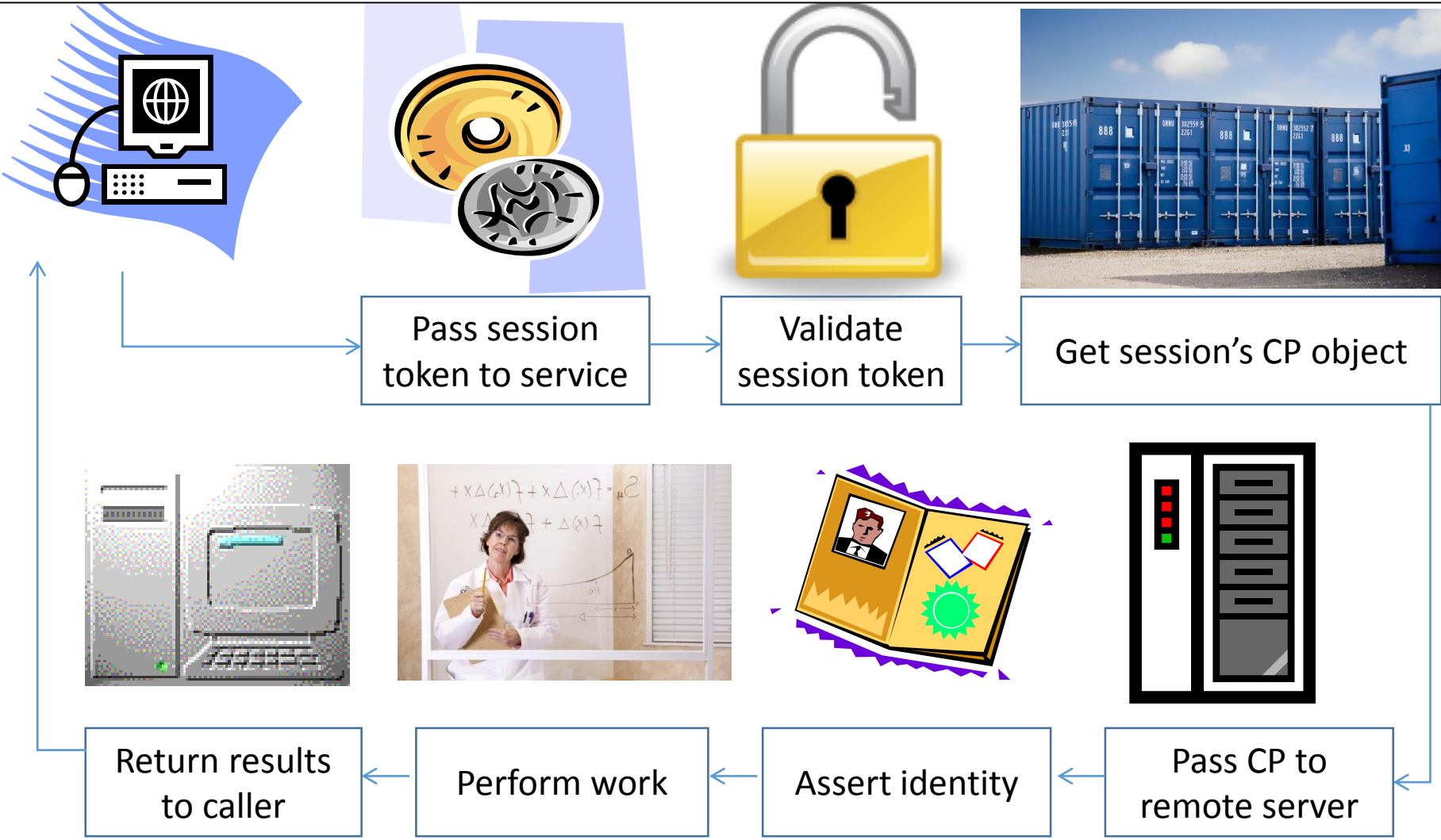
Client Principal – Making a Session Service Call



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Client Principal – Making a Remote Session Service Call



PUG Challenge Americas - Client Principal and Security Sessions

- Programming with the Client-Principle Object -- Chris Longo
- Basics of Identity Mgmt in OpenEdge (Part I) -- Peter Judge
- Coding with ID Mgmt and Security (Part II) -- Peter Judge
- Server Access - The REST of the Story -- Mike Jacobs

Question Period



Migrating to MultiTenancy
Thank you for your time!

TDK
Consulting
Services Inc

This presentation brought to you by:

Tim Kuehn

Senior OpenEdge Consultant

TDK Consulting Services Inc.

519-576-8100 tim.kuehn@gmail.com