User Authentication using the Client Principle Object

Presented By: Chris Longo

BRAVEPOINT

PUG Challenge Americas

Agenda

- What is the Client Principal Object?
- Why is it useful?
- How do I implement the CP Object?

Application Context

- Unique set information associated with a specific user's application session.
- UserID, PlantID, Session
- Effects:
  - Authentication
  - Authorization
  - Query Filtering
  - Conditional Processing

Stateful App Environment

- User application sessions are uniquely bound to a single OpenEdge Client.
- Context persists on the OpenEdge Client
  - Shared Vars
  - Persistent procedures
  - UserID()

Stateless App Environment

- User application sessions share OpenEdge Clients.
- User Context must be re-establish with each OpenEdge Client Interaction.

What is a Client Principal Object?

- Dynamic ABL Object
  - Attribute / Methods
- Maintains a User's Identity
  - UserID / Roles
  - SessionID / Session Expiration
- Sets effective UserID() for a database.
- Does <u>not</u> authenticate UserID and Password

Importance of a CP Object

- Establish User Context
- Maintaining a user's identity in a stateless environment.
- Used to maintain an identity authenticated using an external registry other then _User.
  - Application specific user registry
  - LDAP
- Auditing

Establishing a User's Identity

- OpenEdge Client connect to a database:
  - Authenticate using _User table
  - Login.p
  - Provide -U <userid> -P <passwd>
  - Setuserid() UserID() functions provides identity context for the connected databases.

Establishing a User's Identity

- Application Tables / External Registry
  - Application specific code to Authenticate UserID and Password.
  - May not have and effect on UserID value set for the the connected database.
  - Use the CP Object to apply an application user's identity.

AppServer/Webspeed Agents

- Client Session Identity is established as an agent connects to a database.
  - Most likely at startup
- Agent is shared by many users but the Identity remains set to the UserID of the process that started the Agents.

Session Context

- A User's Identity is part of application session context.
  - Established between and client and an agent with each interaction.
- Need UserID function to recognize session context.
  - Specifically a user's identity.

CP Object

- The CP Object becomes part of a user's session context.
- It can be used to set the UserIDs of <u>all</u> connected databases at run-time

Steps to Using CP Object

- Establish an Authentication Domain
- Create CP Object
- Assign three key attribute
    - UserID
    - Domain Name
    - SessionID
- Seal CP Object
    - Domain AccessKey
- Use It
    - Set UserIDs for connected database

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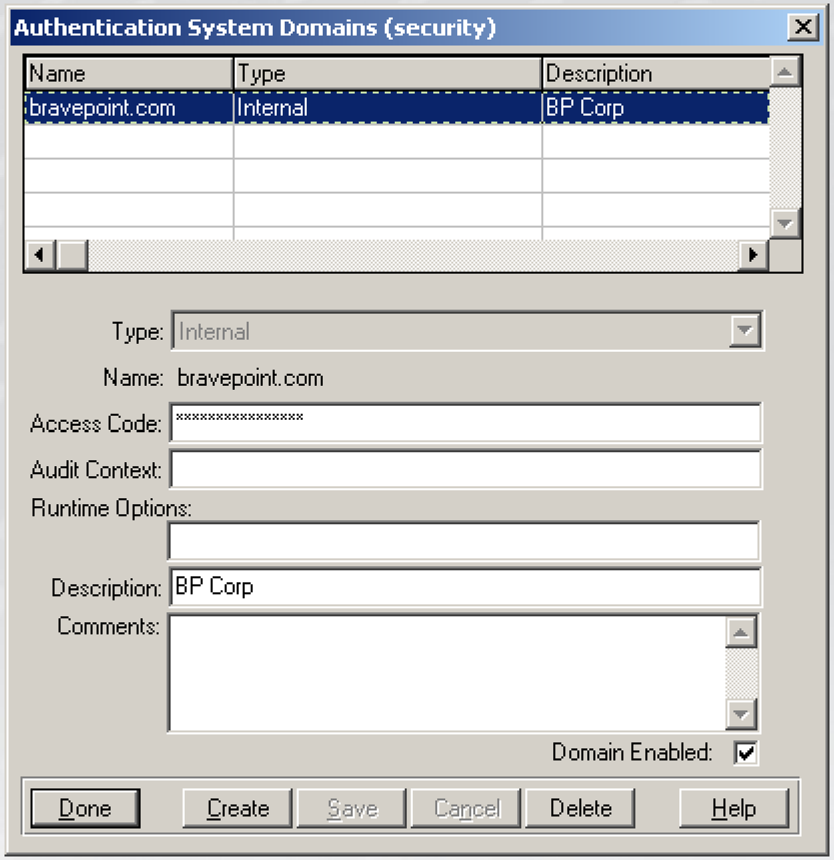
Authentication Domains relationship with a CP Object

- Defined internally using the Data Admin Tool
- Alternately defined externally
- Provides encrypted key (access-key).
- Access-key used to <u>seal</u> and <u>validate</u> CP Objects.

Authentication Domain Setup



Name	Type	Description
bravepoint.com	Internal	BP Corp

Type: Internal

Name: bravepoint.com

Access Code: ****************

Audit Context:

Runtime Options:

Description: BP Corp

Comments:

Domain Enabled: ✓

Security Policy

- An authentication domain must be loaded for a session.
- Security Policy system handle loads domains into the Trusted Domain Registry.
  - security-policy:load-domain('dbName')
    - Domain Registry Locked Automatically
  - security-policy:register-domain('DomainName, AccessKey)
    - security-policy:lock-registeration()

Create CP Object

```
CREATE CLIENT-PRINCIPAL hClientPrincipal.
 /* Set CP Object Values */
hClientPrincipal:SESSION-ID = BASE64-ENCODE(GENERATE-UUID).
hClientPrincipal:USER-ID = pcUserID.
hClientPrincipal:DOMAIN-NAME = 'bravepoint.com'.
hClientPrincipal:DOMAIN-TYPE = 'Internal'.
hClientPrincipal:LOGIN-EXPIRATION-TIMESTAMP =
                                  ADD-INTERVAL(NOW, 60, 'seconds').
hClientPrincipal:ROLES = pcRoles.
hClientPrincipal:SET-PROPERTY('UserPlant', 'Norcross').
```

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Authenticate User Identity

```
IF Identity.IdentityKey <> ENCODE(pcPasswd) THEN DO:
  /* This will set the state-detail attribute */
  hClientPrincipal:AUTHENTICATION-FAILED
      ('UserName Password authenitication failed.').

  pcMessage =  'UserName Password authenitication failed.'.
END.
```

CP Object State

- LOGIN-STATE Attribute
  - LOGIN
  - LOGOUT
  - EXPIRED
  - FAILED
- AUTHENTICATION-FAILED()
  - Used on an unsealed CP Object
  - LOGIN-STATE is set to failed.
  - STATE-DETAIL Attribute is set to the supplied reason.

Seal CP Object

- The Domain Access Key was previously defined using the Data Admin tool or setup manually using register-domain().

```
hClientPrincipal:SEAL(cDomainAccessKey)
```

Set DB Identity

- SET-DB-CLIENT will set the effective UserID for all connected databases or those explicitly specified.

```
SET-DB-CLIENT(hClientPrincipal)
```

CP Object Portability

- CP Object provides methods to import and export it's values.
  - CP Object exports and imports from a raw data type.

```
DEFINE VAR rCP AS RAW NO-UNDO.

rCP = hClientPrincipal:EXPORT-PRINCIPAL().
```

CP Object and Session Context

- Alternative #1:
  - Pass the raw CP Object as a parameter back to the client.
    - Client gets full access to all the CP Objects Attributes.
    - Raw data type might present issue with non ABL clients.
    - Security threat?

CP Object and Session Context

- Alternative #2
  - Store the CP Object in a session context DB Table.
    - CPObject.SessionID AS CHARACTER
    - CPObject.ContextObject AS RAW
  - Pass an encrypted token containing the associated sessionID back to the client.
    - SecureToken is used to reconstitute the CP Object each time a user interacts with an agent.
    - SecureToken is a character string.

CP Object and Session Context

```
/* Store the CP Object as part of a user's session context. */
rCP = hClientPrincipal:EXPORT-PRINCIPAL().
DO TRANSACTION:
  CREATE bCPObject.
  ASSIGN
     bCPObject.SessionID = hClientPrincipal:SESSION-ID
     bCPObject.ContextObject = rCP.
END.
```

CP Object Identity Authentication

```
 cSessionID = STRING(DECRYPT(BASE64-DECODE(pcSecToken), rEncryptKey))
 NO-ERROR.


 /* Create an empty CP Object. */
 CREATE CLIENT-PRINCIPAL hClientPrincipal.

 /* Find the session context row containing the previously saved
    CP Object Data. */

FIND bCPObject WHERE bCPObject.SessionID = cSessionID NO-LOCK NO-ERROR.
IF NOT AVAIL bCPObject THEN
          UNDO, THROW NEW Progress.Lang.AppError('Unable to authenticate
user. Could not find CPObject context.', 104).


/* Load the CP Object. So you left with a CP Object as it
   existed after you sealed it during createCPObject. */

hClientPrincipal:IMPORT-PRINCIPAL(bCPObject.ContextObject).
```

Validate CP Object

- VALIDATE-SEAL(*domainKey*)
  - Validates the CPObject's MAC, which was previously generated via the SEAL().
  - Must supply the DomainKey used to seal the CPObject.
- LOGOUT()
  - In validates a sealed CP Object
  - No longer use it to set DB UserIDs
  - Sets the LOGIN-STATE to LOGOUT

Validate CP Object

```
hClientPrincipal:IMPORT-PRINCIPAL(bCPObject.ContextObject).

IF NOT hClientPrincipal:VALIDATE-SEAL(cDomainAccessKey) THEN DO:

    hClientPrincipal:LOGOUT().

    UNDO, THROW NEW Progress.Lang.AppError(

    SUBSTITUTE('CP Object Validation Failed. Login-State = &1',
    hClientPrincipal:LOGIN-STATE), 105).

END.
```

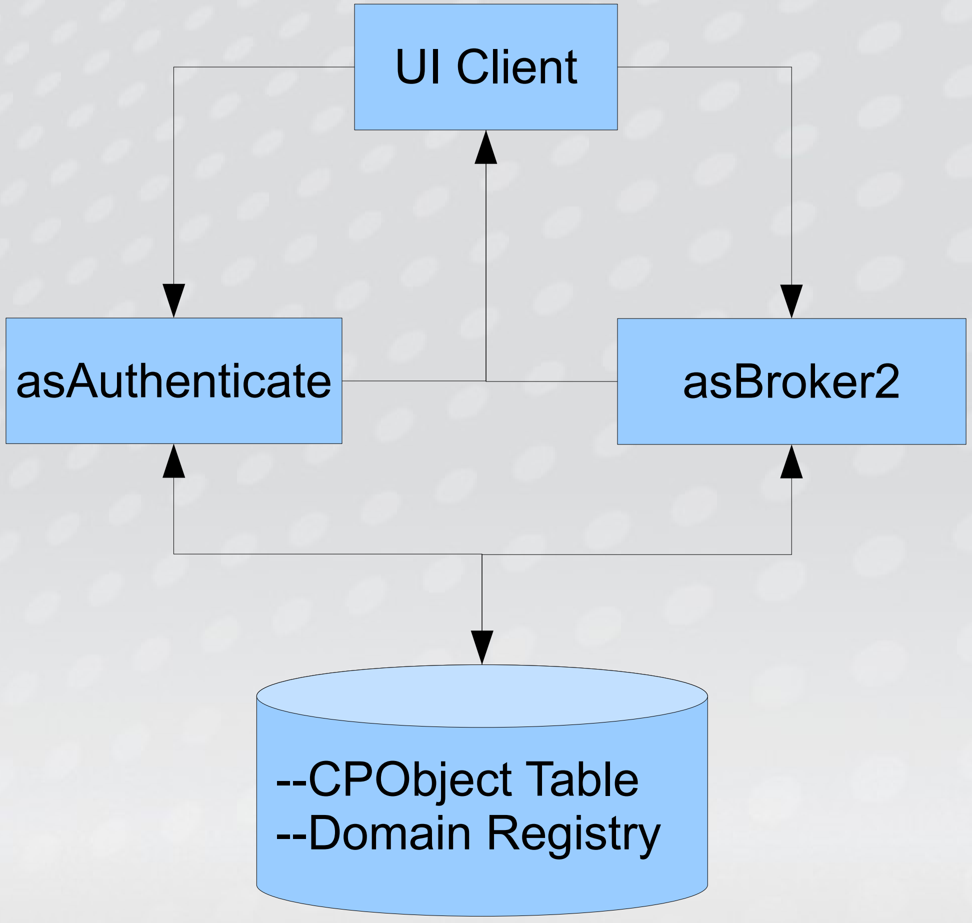
Session Expiration

- SEAL-TIMESTAMP
  - Automatically set.
  - Date and time of when the CP Object was sealed.
- LOGIN-EXPIRATION-TIMESTAMP
  - Programmatically set to some point in the future.
  - LOGIN-STATE set to 'Expired' if not sealed prior to the value set in this attribute.

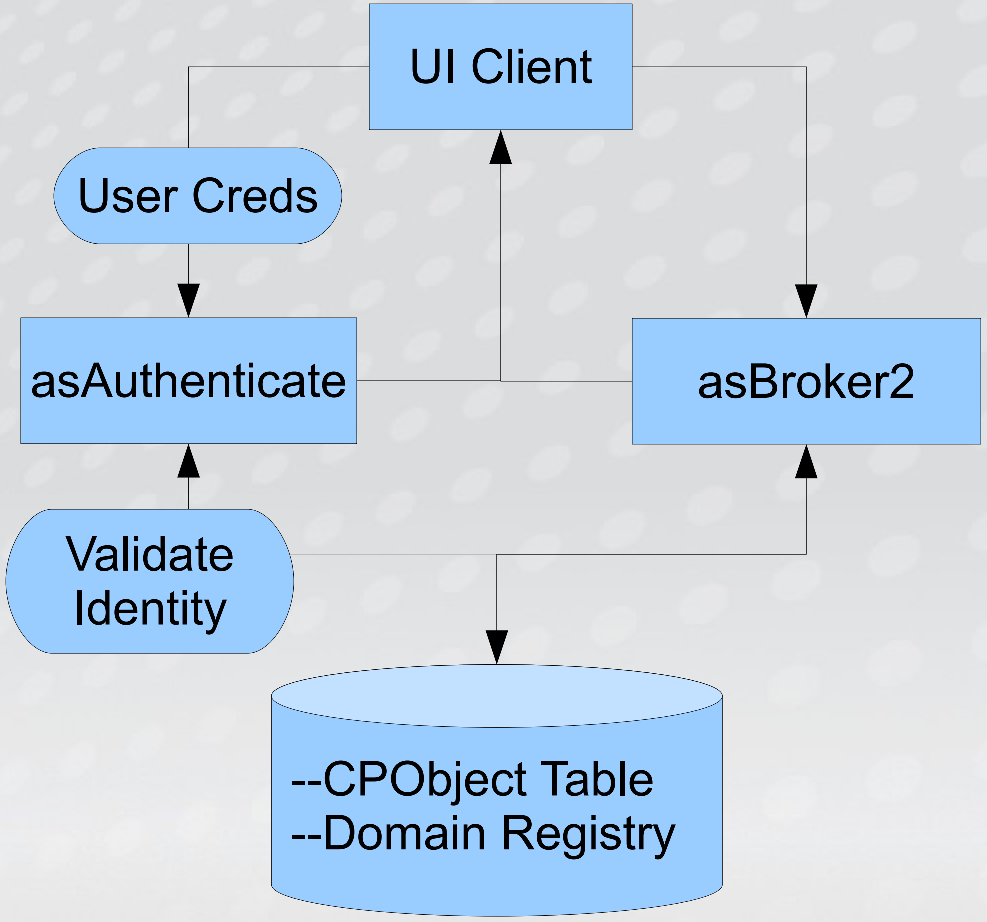
Session Expiration

```
/* Check expiration */
 IF hClientPrincipal:LOGIN-EXPIRATION-TIMESTAMP < NOW THEN DO:
   /* This will set the state-detail attribute */
    hClientPrincipal:AUTHENTICATION-FAILED
    ('User Session Expired.').
    hClientPrincipal:LOGOUT().
    DO TRANSACTION:
       FIND CURRENT bCPObject EXCLUSIVE-LOCK.
       prCP = hClientPrincipal:EXPORT-PRINCIPAL().
       bCPObject.ContextObject = prCP.
    END.
 END.
```

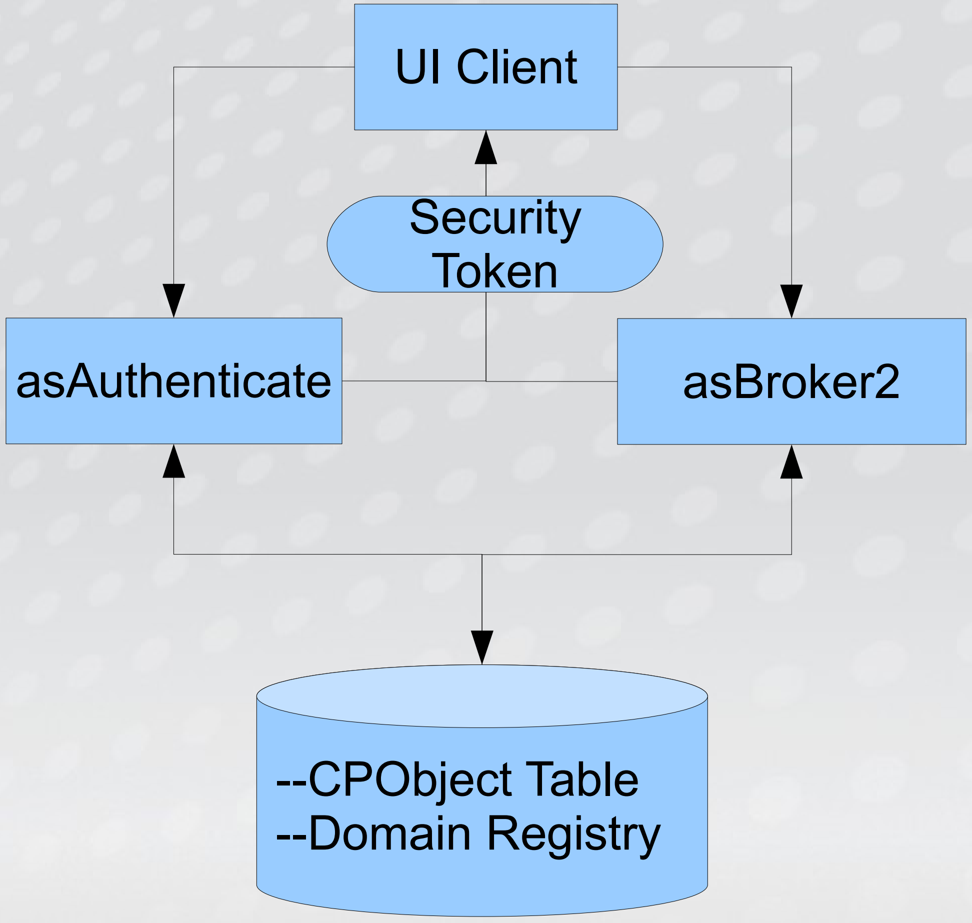
Demo App


UI Client
asAuthenticate
asBroker2
--CPObject Table
--Domain Registry

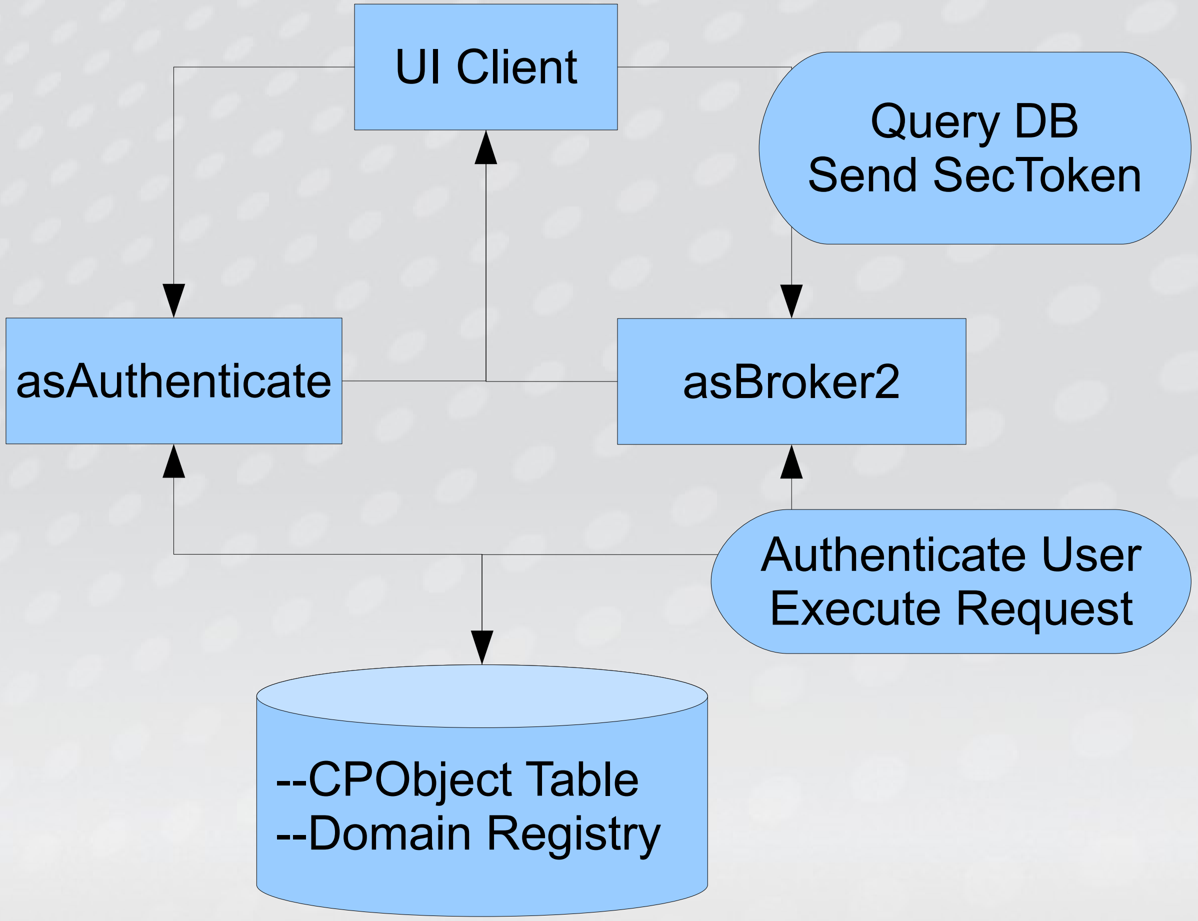
Demo App


UI Client
User Creds
asAuthenticate
asBroker2
Validate Identity
--CPObject Table
--Domain Registry

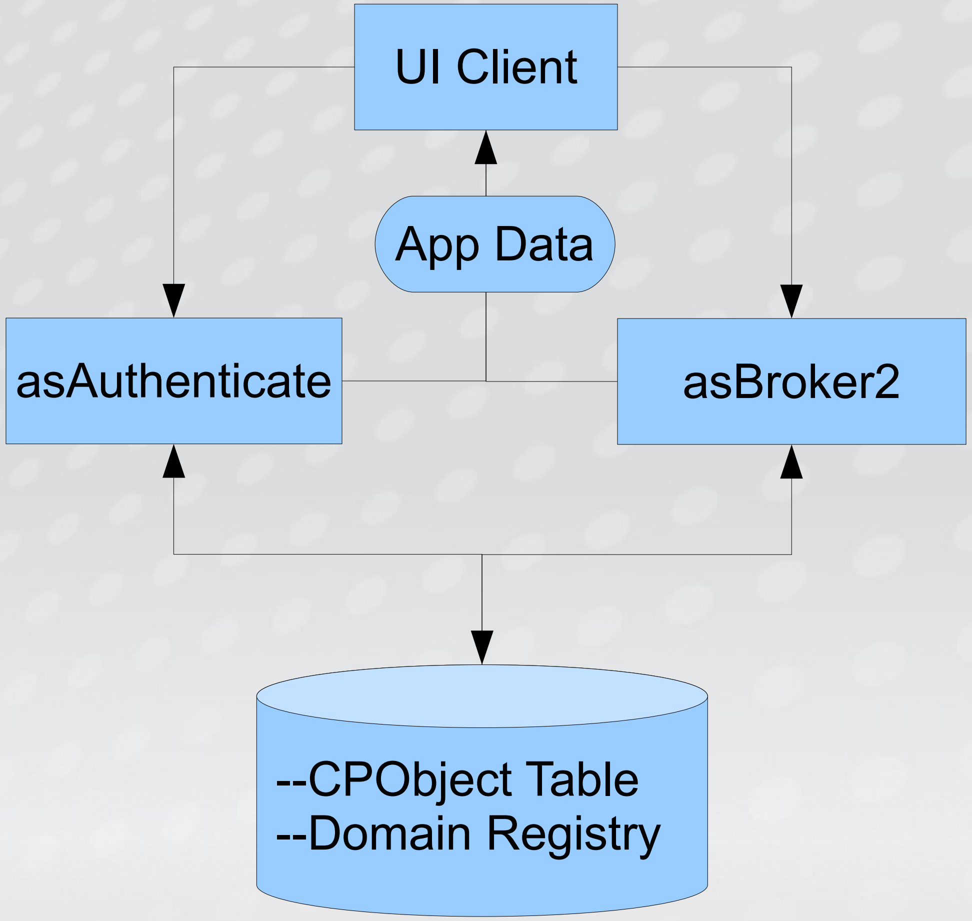
Demo App


UI Client
Security Token
asAuthenticate
asBroker2
--CPObject Table
--Domain Registry

Demo App


UI Client
Query DB
Send SecToken
asAuthenticate
asBroker2
Authenticate User
Execute Request
--CPObject Table
--Domain Registry

Demo App


UI Client
App Data
asAuthenticate
asBroker2
--CPObject Table
--Domain Registry

Questions?