All types of data replication with OE databases

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All types of data replication

After-Image (Log based) Replication

OpenEdge Replication

Pro2 Replication

Custom Replication

All types of data replication

After-Image Replication

Version 5 (late 80-es)

$DLC/bin/rfutil db-name –C roll forward –a ai-name

$DLC/bin/rfutil db-name –C roll forward retry –a ai-name

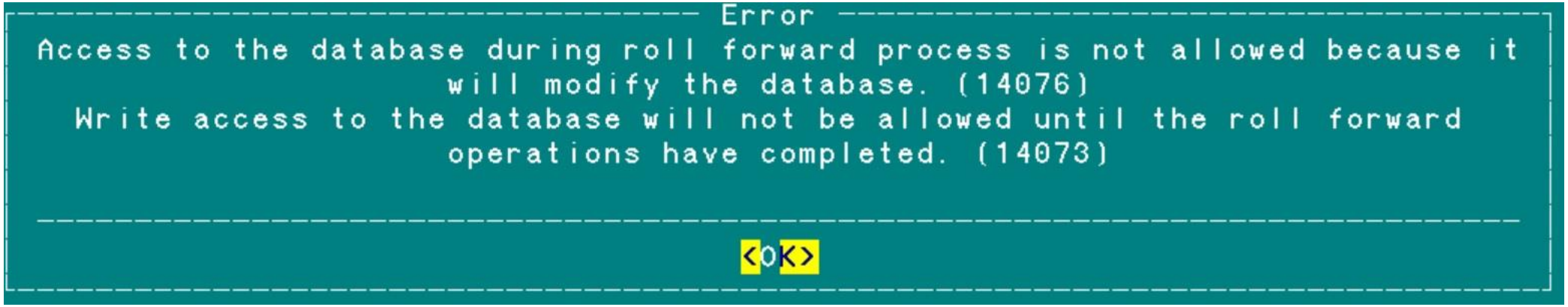
$DLC/bin/rfutil db-name –C roll forward oplock –a ai-name

(10.1C)

Roll forward oplock

```
OpenEdge Release 11.7.1 as of Wed Jun 14 19:00:30 EDT 2017

Database has been locked during roll forward processes. (14072)
Write access to the database will not be allowed until the roll forward operatio
ns have completed. (14073)
```



Roll forward oplock

$DLC/bin/rfutil db-name –C roll opunlock

```
Unlocking the database with rfutil db_name roll opunlock
OpenEdge Release 11.7.3 as of Fri Apr 27 17:00:39 EDT 2018

The database will go through crash recovery and no roll forward can be executed
after this. (14077)
Are you sure you want to disable the protection on roll forward? (y/n) (14078)
Database has been unlocked during roll forward process. (14074)
```

All types of data replication

OpenEdge Replication

Fathom Replication 1.0 (Since Progress v9 in 2001)

OpenEdge Replication Oracle Data Guard

OpenEdge Replication **Plus** –
either a separate license or part of Advanced Enterprise License

All types of data replication

Pro2 Replication

BravePoint product

Pro Dump & Load (Dan Foreman and Co)

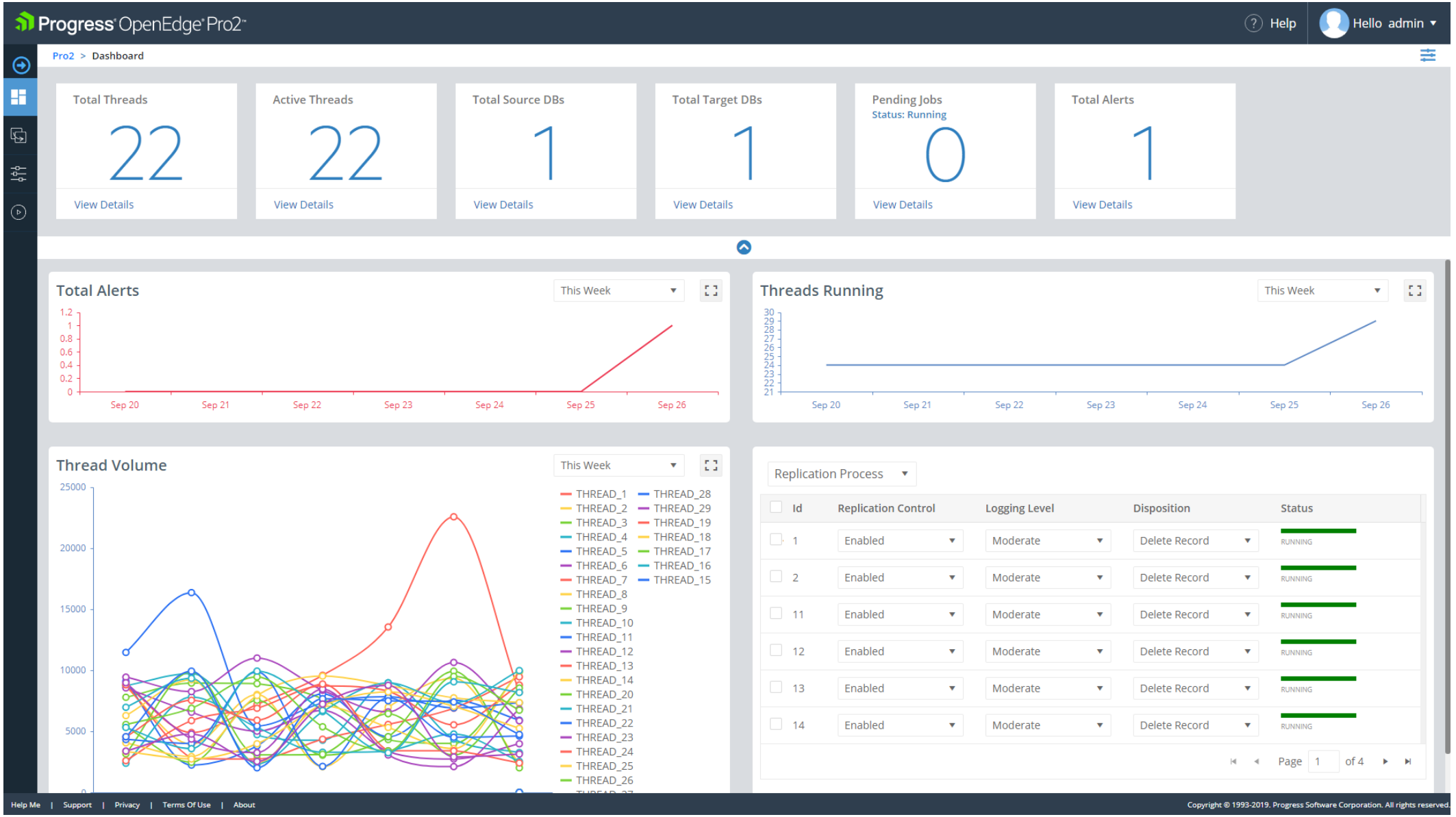
pro2pro pro2sql pro2ora

Pro2 Version 5 introduced CDC. We have version 4.6.7

Pro2 Version 6.0

1. It is browser based vs GUI client

2. It has background jobs


Progress OpenEdge Pro2
Help
Hello admin
Pro2 > Dashboard
Total Threads
22
View Details
Active Threads
22
View Details
Total Source DBs
1
View Details
Total Target DBs
1
View Details
Pending Jobs
Status: Running
0
View Details
Total Alerts
1
View Details
Total Alerts
This Week
1.2
1
0.8
0.6
0.4
0.2
0
Sep 20
Sep 21
Sep 22
Sep 23
Sep 24
Sep 25
Sep 26
Threads Running
This Week
30
29
28
27
26
25
24
23
22
21
Sep 20
Sep 21
Sep 22
Sep 23
Sep 24
Sep 25
Sep 26
Thread Volume
This Week
25000
20000
15000
10000
5000
THREAD_1
THREAD_2
THREAD_3
THREAD_4
THREAD_5
THREAD_6
THREAD_7
THREAD_8
THREAD_9
THREAD_10
THREAD_11
THREAD_12
THREAD_13
THREAD_14
THREAD_20
THREAD_21
THREAD_22
THREAD_23
THREAD_24
THREAD_25
THREAD_26
THREAD_28
THREAD_29
THREAD_19
THREAD_18
THREAD_17
THREAD_16
THREAD_15
Replication Process
Id
Replication Control
Logging Level
Disposition
Status
1 Enabled Moderate Delete Record RUNNING
2 Enabled Moderate Delete Record RUNNING
11 Enabled Moderate Delete Record RUNNING
12 Enabled Moderate Delete Record RUNNING
13 Enabled Moderate Delete Record RUNNING
14 Enabled Moderate Delete Record RUNNING
Page 1 of 4
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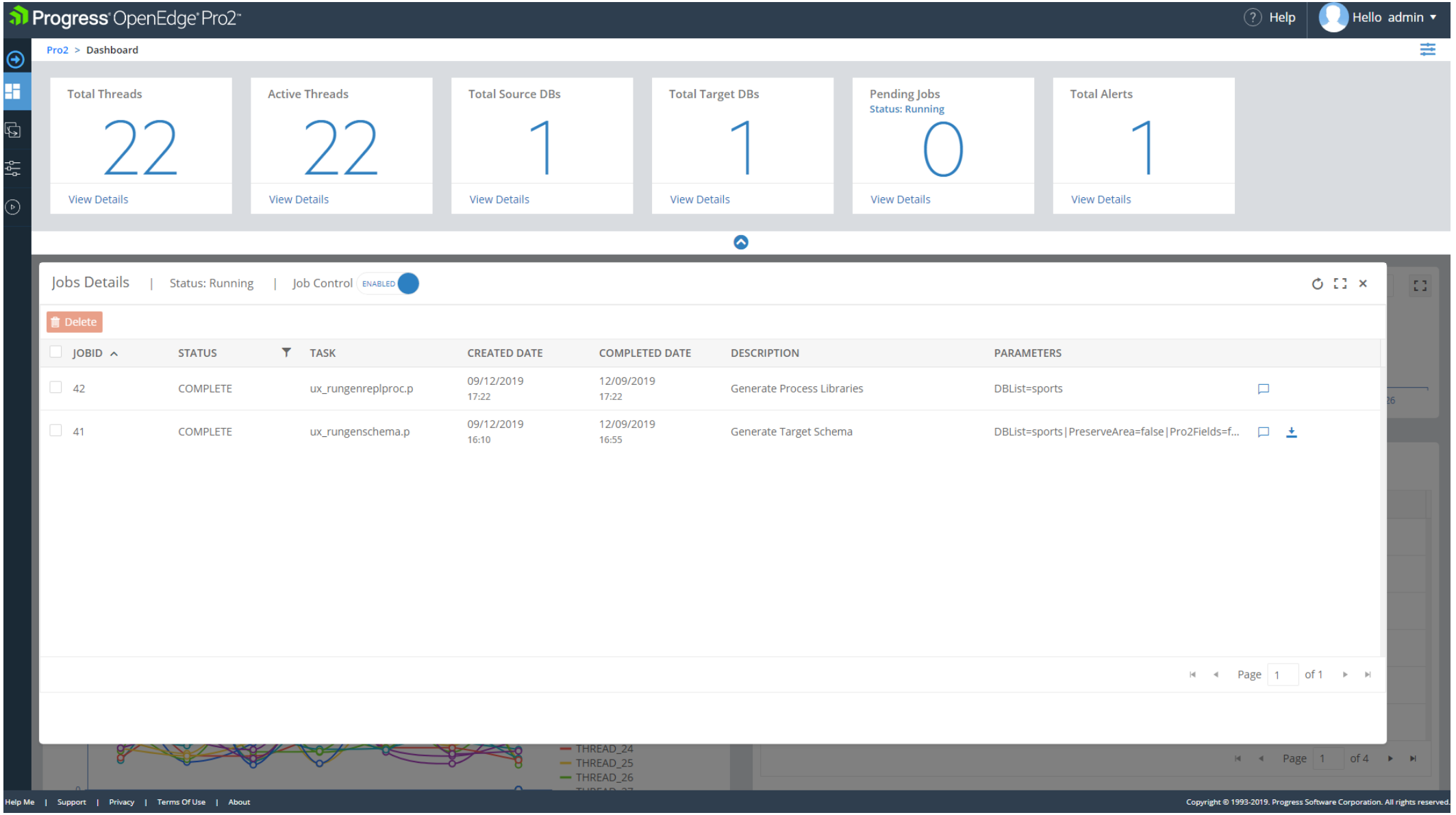
Progress OpenEdge Pro2
Help
Hello admin
Pro2 > Dashboard
Total Threads
22
View Details
Active Threads
22
View Details
Total Source DBs
1
View Details
Total Target DBs
1
View Details
Pending Jobs
Status: Running
0
View Details
Total Alerts
1
View Details
Jobs Details | Status: Running | Job Control ENABLED
Delete
JOBID
STATUS
TASK
CREATED DATE
COMPLETED DATE
DESCRIPTION
PARAMETERS
42
COMPLETE
ux_rungenreplproc.p
09/12/2019 17:22
12/09/2019 17:22
Generate Process Libraries
DBList=sports
41
COMPLETE
ux_rungenschema.p
09/12/2019 16:10
12/09/2019 16:55
Generate Target Schema
DBList=sports|PreserveArea=false|Pro2Fields=f...
Page 1 of 1
THREAD_24
THREAD_25
THREAD_26
Page 1 of 4
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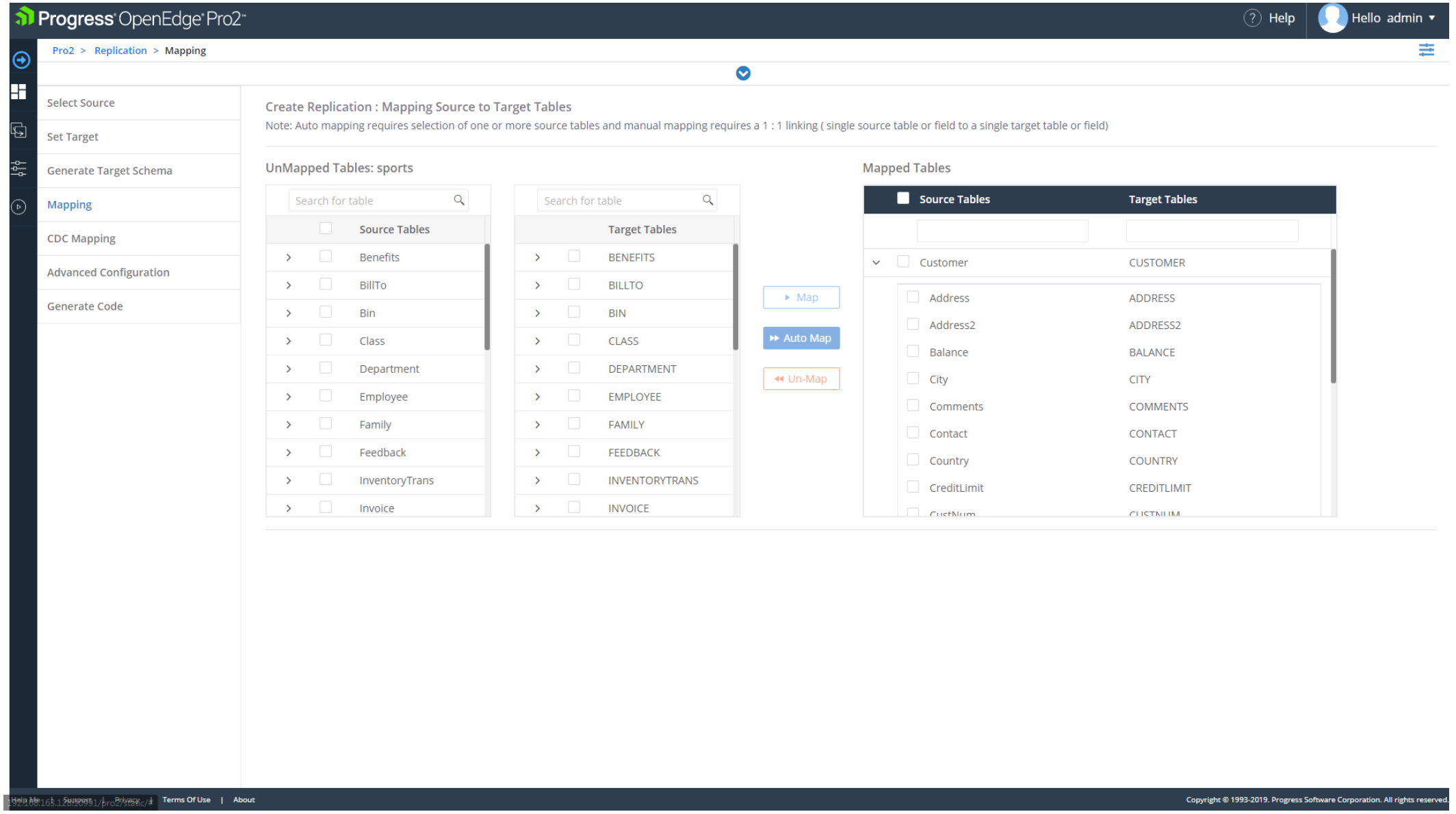
Progress OpenEdge Pro2
Help
Hello admin
Pro2 > Replication > Mapping
Select Source
Set Target
Generate Target Schema
Mapping
CDC Mapping
Advanced Configuration
Generate Code
Create Replication : Mapping Source to Target Tables
Note: Auto mapping requires selection of one or more source tables and manual mapping requires a 1 : 1 linking (single source table or field to a single target table or field)
UnMapped Tables: sports
Search for table
Source Tables
Benefits
BillTo
Bin
Class
Department
Employee
Family
Feedback
InventoryTrans
Invoice
Search for table
Target Tables
BENEFITS
BILLTO
BIN
CLASS
DEPARTMENT
EMPLOYEE
FAMILY
FEEDBACK
INVENTORYTRANS
INVOICE
Map
Auto Map
Un-Map
Mapped Tables
Source Tables
Target Tables
Customer
CUSTOMER
Address
ADDRESS
Address2
ADDRESS2
Balance
BALANCE
City
CITY
Comments
COMMENTS
Contact
CONTACT
Country
COUNTRY
CreditLimit
CREDITLIMIT
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All types of data replication

Custom Replication

Export data from Progress. Create .txt files. Daily.

Import data into Oracle. Using Oracle External Tables.

SAP

Business Objects™

All types of data replication

Oracle

After-Image (Log based) Replication

OpenEdge Replication

Pro2 Replication

Custom Replication

Redo Log Shipment

Oracle Data Guard

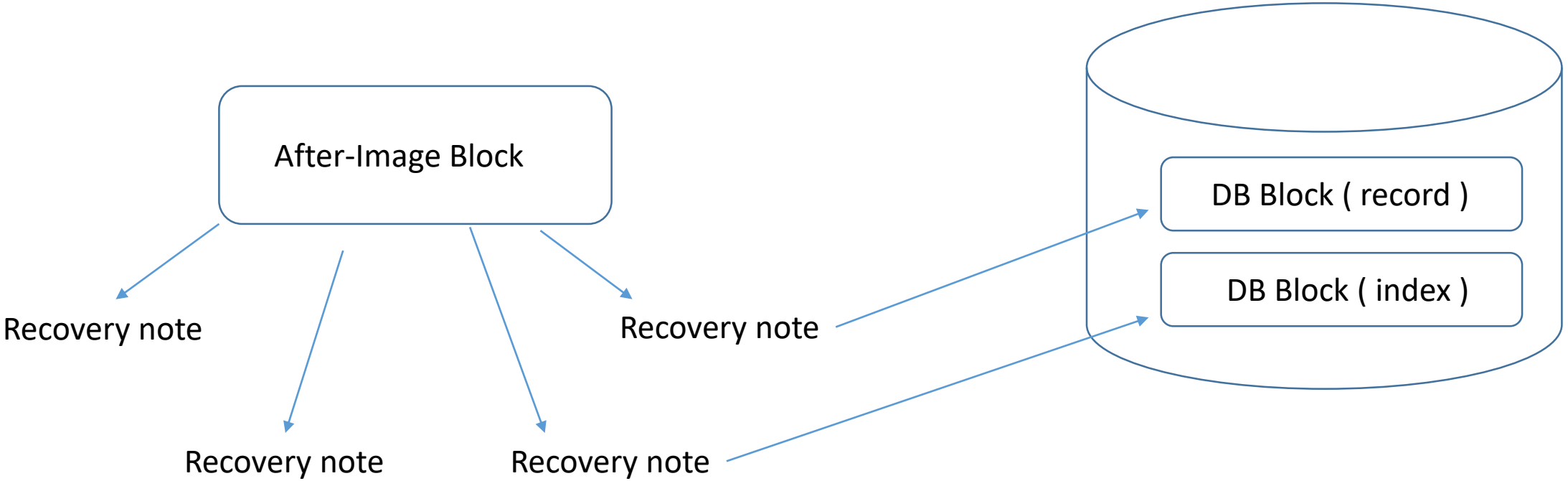
Oracle Golden Gate

Custom Replication

Is it possible to Update Replication Target DB?

- Oracle 19c -- Active Data Guard DML Redirect
- Set startup parameter “ADG_REDIRECT_DML” to TRUE
  ALTER SESSION ENABLE ADG_REDIRECT_DML;

	After-Image	OE Replication	Pro2
Whole / Partial	Whole Database	Whole Database	Partial / Table by Table
Unit	AI-Block	AI-Block	Record



_StorageObject._Object-number ???

	After-Image	OE Replication	Pro2
Whole / Partial	Whole Database	Whole Database	Partial / Table by Table
Unit	AI-Block	AI-Block	Record
DB Type	Pro to Pro	Pro to Pro	Pro to Other
Can use for DR/backup	Yes	Yes	Usually no
Can use for data reorganization	No	No	Yes (pro2pro)
Throughput	Fast	Faster	Slower
Instant replication	No	Yes	Yes
License	No	Yes	Yes
Access to Target DB	No	Yes (OE Repl Plus)	Yes
How difficult to setup	Very easy	Easy	More difficult / PSC help
Possibility of delay	Yes	No	May be

Possibility to delay replication using After-Image replication

Physical Corruption

Corruptions leading to errors with standard operations:
Reading, back out of a transaction, crash recovery

Logical Corruption

“Hand made corruptions” – deleting or wrongly changing important data

Both Corruptions could be fixed by delayed replication

Possibility to delay replication using After-Image replication

How long to delay? That is a question.

Time more than the longest transaction

Time when we expect to discover a physical or logical corruption
That is a very practical question.

Time to bring replication to current.

So it is a compromise between possibility of discovering corruption and time to transfer warm spare into live production database.

Possibility to delay replication using After-Image replication

Replication delay helps in investigation of issues

$DLC/bin/rfutil empty -C aimage truncate -aiblocksize <your_db_ai_block_size>

$DLC/bin/rfutil empty -C aimage scan verbose -a ai_file > some_file.txt

Any database with the same after-image block size

LIVE
DEMO

Demo slides (in case demo does not work)

(S-Source) proutil /home/job183/demo/sports -C enableSiteReplication source
(S) probkup online /home/job183/demo/sports /home/job183/demo/sports.bkp –REPLTargetCreation
(S) ftp.sh – FTP backup created in previous step from Source to Target
(T-Target) prorest /home/job183/demo/sports sports.bkp –verbose
(T) proutil /home/job183/demo/sports -C enableSiteReplication target
(T) proserve -pf /home/job183/demo/sports_target.pf
(S) dsrutil /home/job183/demo/sports -C restart server
---------- Monitoring ----------
(S/T) dsrutil /home/job183/demo/sports –C status
(S/T) dsrutil /home/job183/demo/sports –C status –verbose
(S/T) dsrutil /home/job183/demo/sports -C monitor

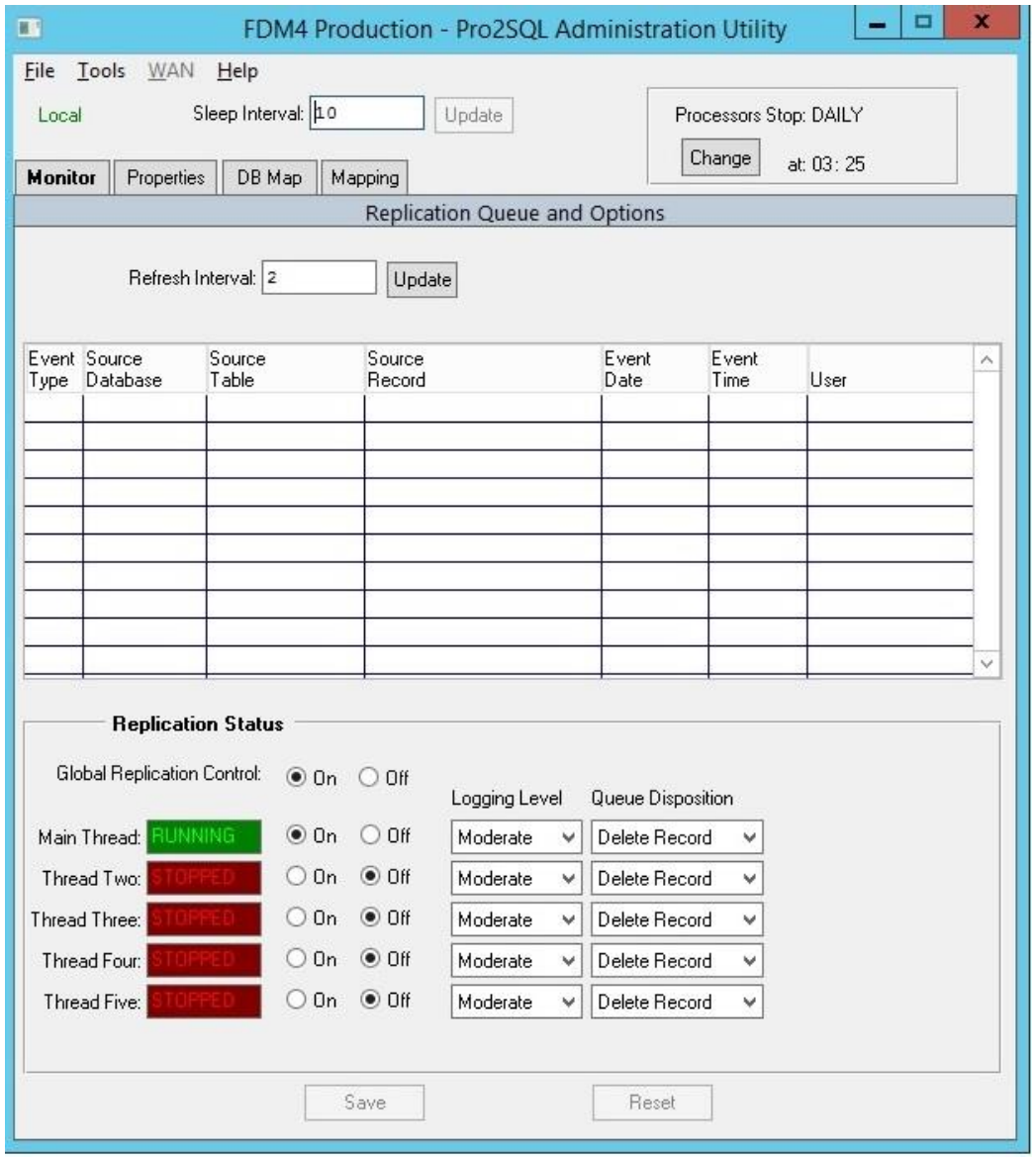
Demo slides (in case demo does not work)

Sample of sports.repl.properties file

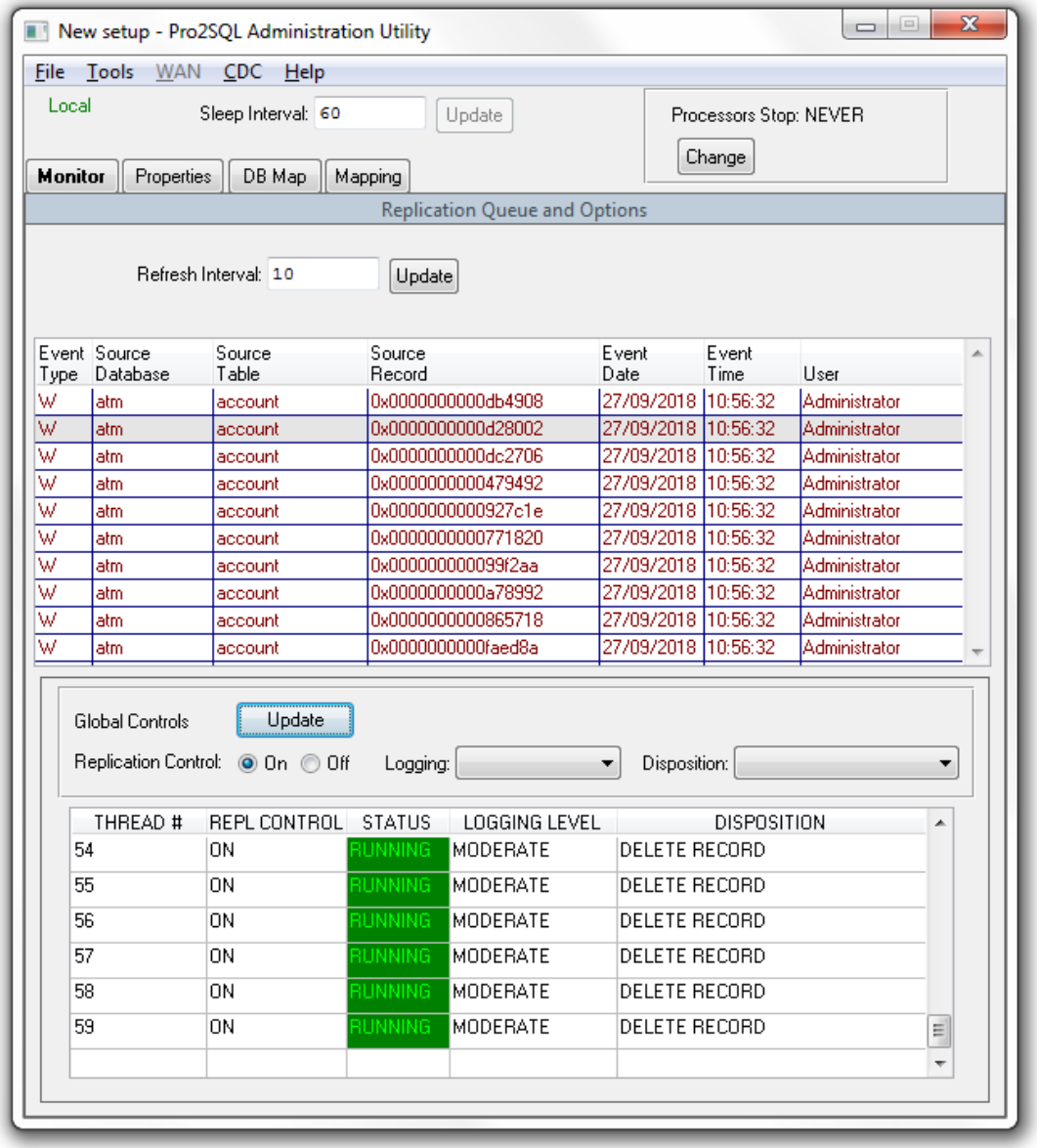
```
[server]
   control-agents=sportsagent1
   database=sports
Transition →  transition=manual
Transition →  agent-shutdown-action=recovery
Transition →  transition-timeout=600
   defer-agent-startup=5760

[control-agent.sportsagent1]
   name=sportsagent1
   database=sports
   host=<Server-name>
   port=65016
   connect-timeout=120
   replication-method=async
   critical=0
```

```
[agent]
   name=sportsagent1
   database=sports
   listener-minport=30003
   listener-maxport=30100

[transition]
Transition →  transition-to-agents=sportsagent1
Transition →  database-role=reverse
Transition →  auto-begin-ai=1
Transition →  auto-add-ai-areas=0
Transition →  source-startup-arguments=-DBService replserv -S
                demosports -pica 8192
Transition →  target-startup-arguments=-S 65016 -DBService
                replagent
Transition →  restart-after-transition=0
```

Demo slides (in case demo does not work)

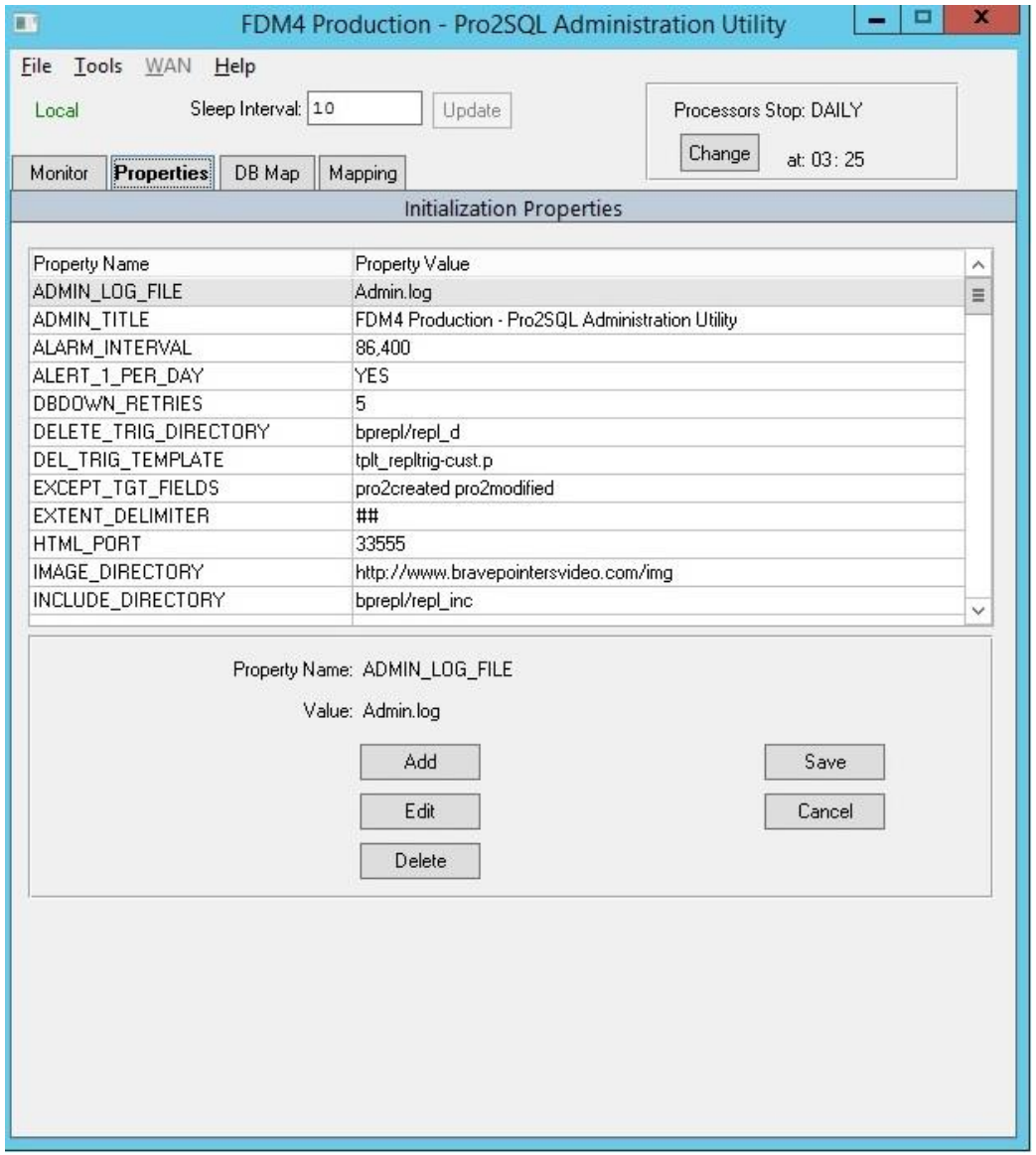


Demo slides

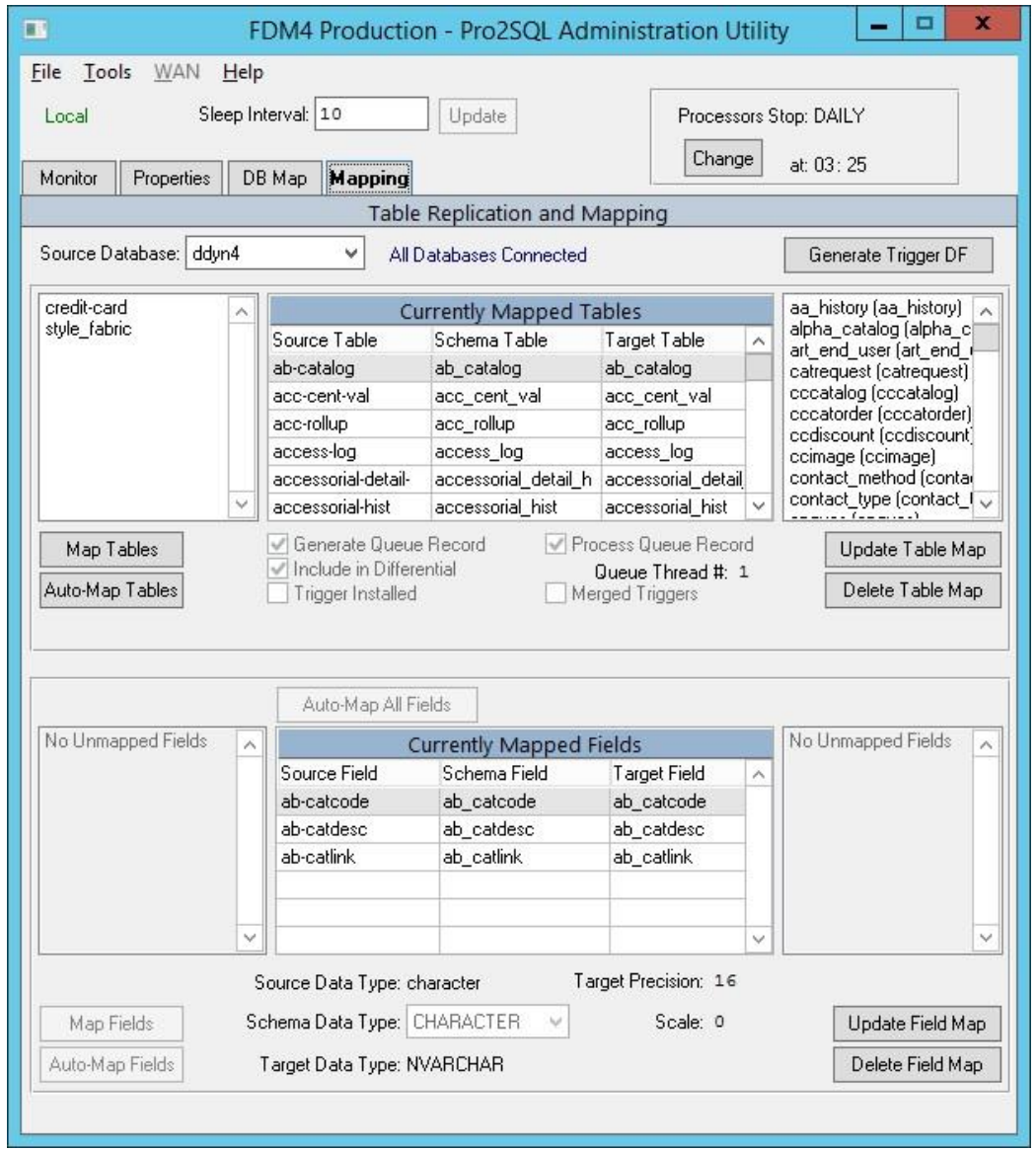


Pro2 Version 5

Demo slides (in case demo does not work)



Demo slides (in case demo does not work)



Parameter -pica (Plugin Communication Area) Database Service Manager Queue

-pica is just a buffer for AI messages to be sent from source to target

Parameter -pica (Plugin Communication Area)

How to measure “in-pipe”? Promon / R&D / 2 / 6 _ActAILog VST

```
 10/03/18          Activity: AI Log
16:18:41        10/03/18 16:18 to 10/03/18 16:18 (11 sec)

                                        Total          Per Min          Per Sec
    Per Tx

Total AI writes                           636             3469            57.82
      0.16
AIW AI writes                             626             3415            56.91
      0.16
Records written                         59981           327169          5452.82
     14.90
Bytes written                                                           939771.91
   2567.68
Busy buffer w                                                0             0.00
      0.00
Buffer not avail                            0                0             0.00
      0.00
Partial writes                              4               22             0.36
      0.00
Log force waits                             0                0             0.00
```

AI writes per sec * after-image block size

57.82 * 16,384 = 947,322

Parameter -pica (Communication queue) Database Service Manager Queue

-pica is just a buffer for AI messages to be sent from source to target

RPLS process

AIW

Parameter -pica (Plugin Communication Area)

How to measure pool ?

Promon / R&D / 1 / 16 _dbservicemanager VST

```
Enter a number, <return>, P, T, or X (? for help): 16

 10/03/18          Status: Database Service Manager
16:58:18

Communication Area Size    :       262144.00 KB
  Total Message Entries    :         2396736
  Free Message Entries     :         2396736
  Used Message Entries     :               0
  Used HighWater Mark      :            1559
  Area Filled Count        :               0
  Service Latch Holder     :              -1
  Access Count             :         4800658
  Access Collisions        :            2331

Registered Database Service Objects
```

Pool Size

Air

Water

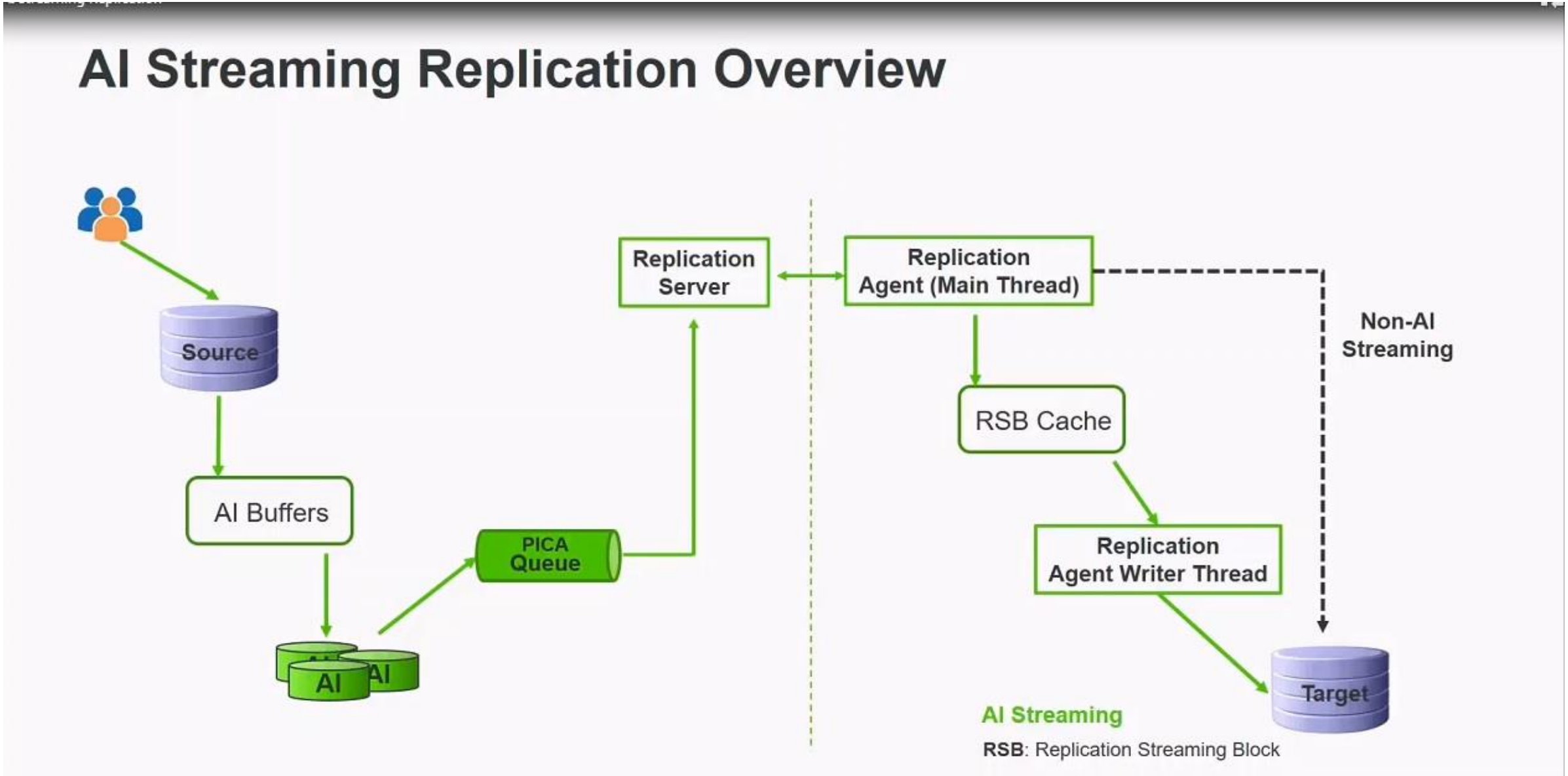
2x AI blocks proc

-pica 262144

Total Message Entries 2,396,736 * 112 = 262143 KB

Parameter -pica (Plugin Communication Area)

OE version 12 new feature – AI Streaming



Parameter -pica (Plugin Communication Area)

[agent]

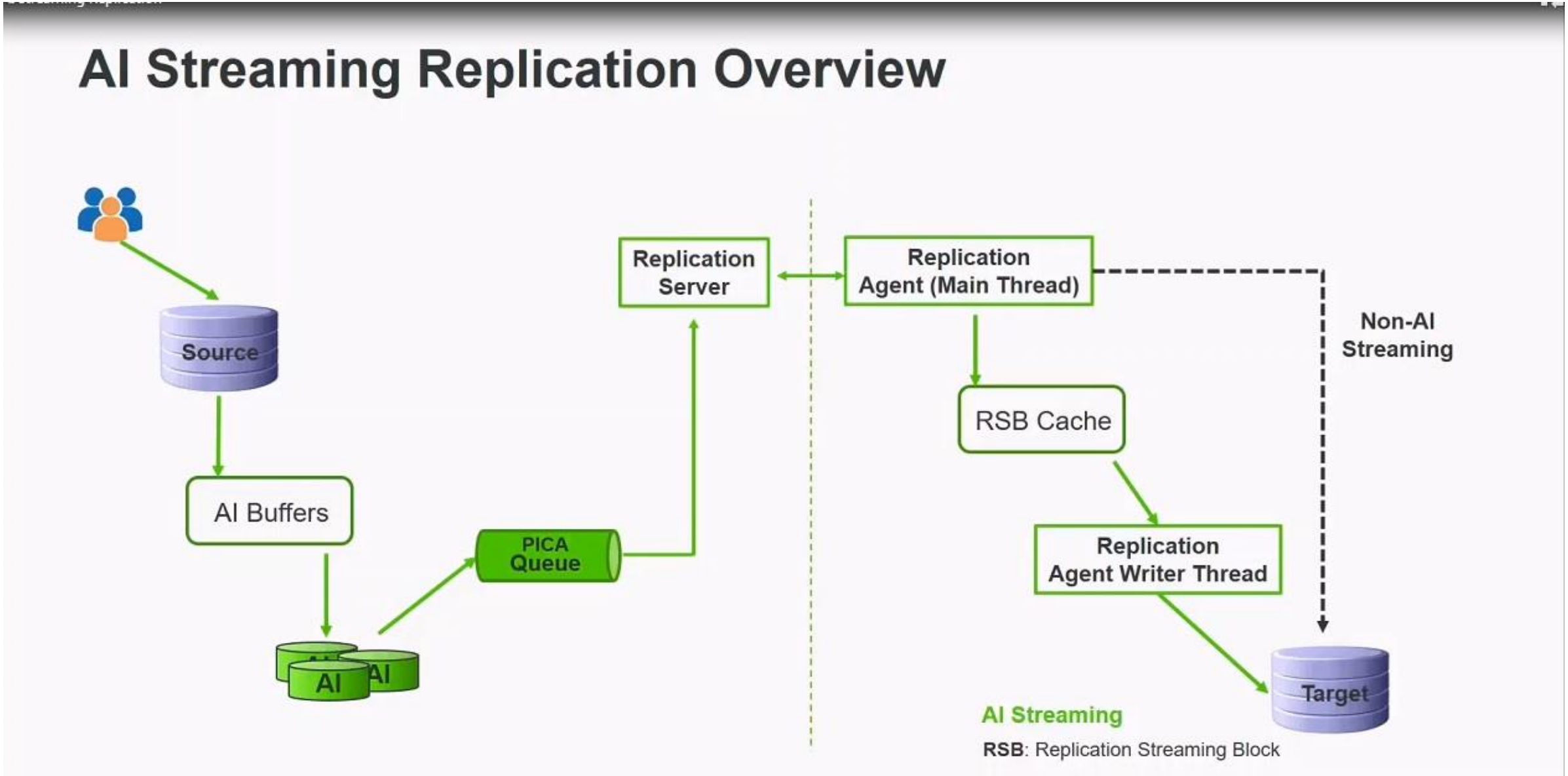
ai-streaming=1	AI Streaming is enabled
rsb-cache-size=5000	Specifies the size of the Replication Streaming cache in units of an AI block

[agent]

ai-streaming=0	AI Streaming is disabled
rsb-cache-size=5000	ignored

See _Repl-AgentAIStreaming VST for details

OE version 12 new feature – AI Streaming



Starting 12.0 only asynchronous commit mode is supported.
Synchronous commit mode no longer supported.

New in version 12.1 Replication properties validation utility
dsrutil db-name -C validate

In future version 12.2 -pica could be changed online

Startup parameters

- Startup parameters on Source and Target should be the same

```
-L 500000
-B 20000
-spin 5000
# Startup parameters on Source and Target should be the same
-n 2700
-bibufs 200
-aibufs 200
-Mn 25
-Mi 2
-Mpb 1
-lruskips 100
-Mxs 5000
-tablerangesize 200
-indexrangesize 250
-crStatus 15
-crTXDisplay
-numCheckpointStats 128
-normtshutdown
-pf /usr/dbs/sof/pro2sqldb_repl.pf
```

Startup parameters

When Source and Target parameters do not match

Source_DB: status code 6060: Server is ended

Target_DB: status code 1063: Agent is Ended

```
[2018/06/01@03:50:15.796-0400] P-53805478   T-1     I RPLS   26: (10842) Connect
ing to Fathom Replication Agent pro2agent1.
[2018/06/01@03:50:18.820-0400] P-53805478   T-1     I RPLS   26: (19049) The sum
 value of database startup parameters -n and -Mn must be greater than or equal t
o the value on the Source database.
[2018/06/01@03:50:18.824-0400] P-53805478   T-1     I RPLS   26: (10700) The Fat
hom Replication Agent pro2agent1 is being terminated.
```

Startup parameters

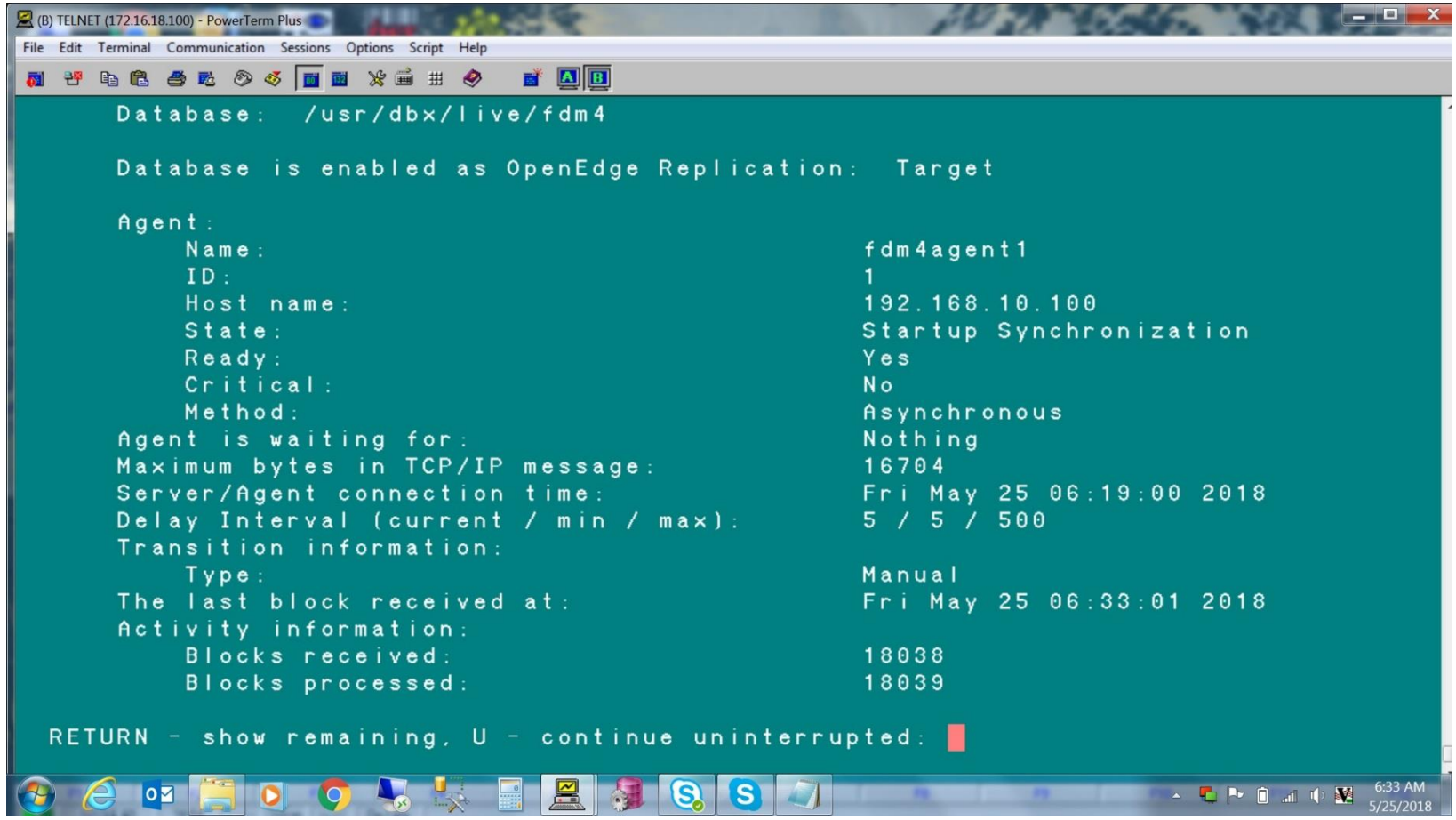
- replication related parameters we put into a separate .pf

```
[corpdev]/home/job183/demo> ls sports*pf
sports.pf          sports_source.pf  sports_target.pf
[corpdev]/home/job183/demo> cat sports_source.pf
-pf /home/job183/demo/sports.pf
-S demosports
-pica 8192
-DBService Replserv
[corpdev]/home/job183/demo> cat sports_target.pf
-pf /home/job183/demo/sports.pf
-S 65016
-DBService replagent
[corpdev]/home/job183/demo> cat sports.pf
# Startup Parameters
-db /home/job183/demo/sports
-L 10000
-B 2000
-c 100
-n 100
-spin 2000
-Mn 15
-Mpb 5
```

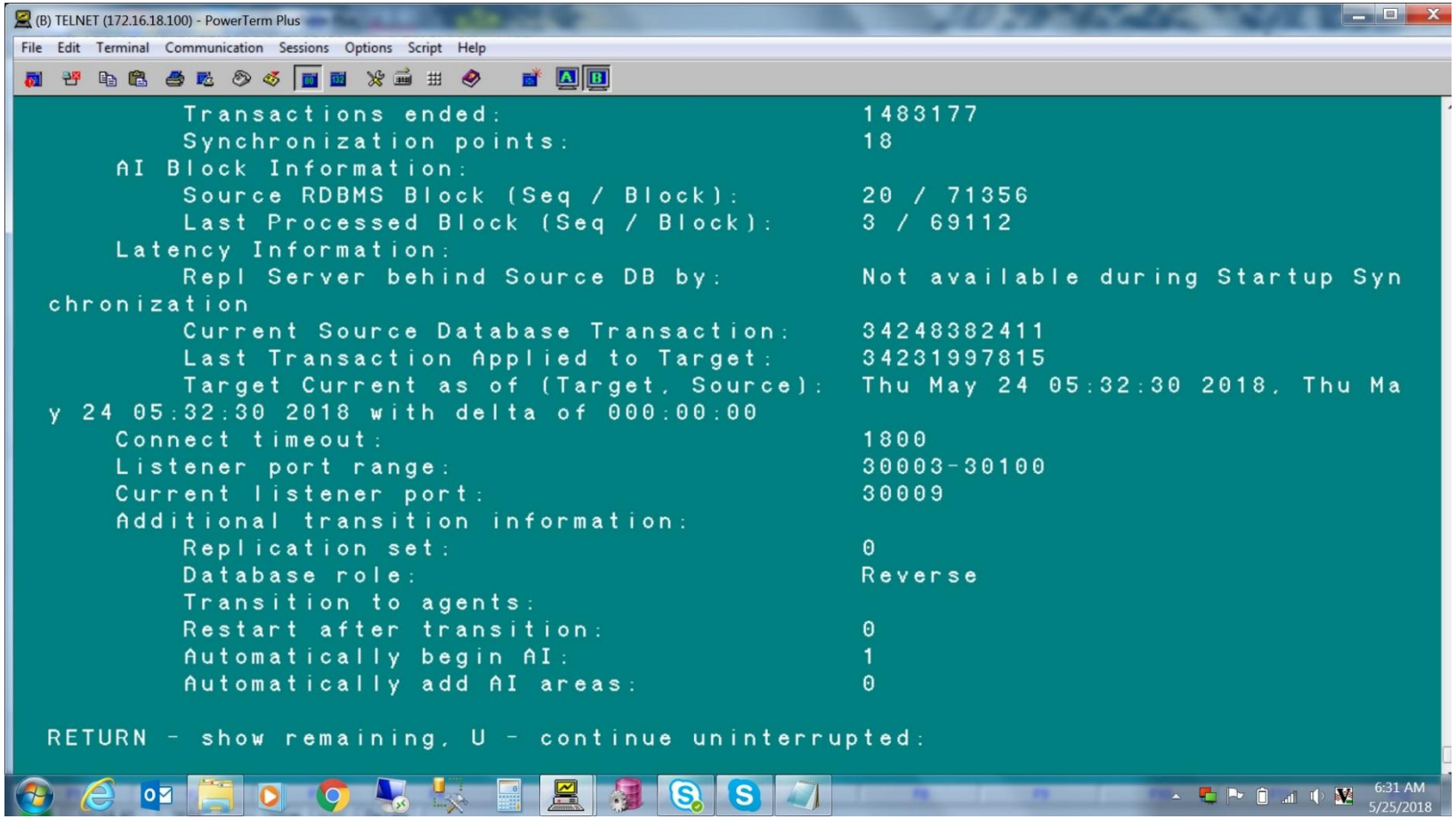
Startup Synchronization

```
[alphas3]/home/job183> dsrutil /usr/dbx/live/imi -C monitor

   OpenEdge Replication Monitor                    Page 1

    Database:  /usr/dbx/live/imi

    S.  Replication server status
    R.  Replication server remote agents
    A.  Replication agent status
    I.  Replication inter-agent status

    M.  Modify display defaults
    Q.  Quit

    Enter your selection:
```

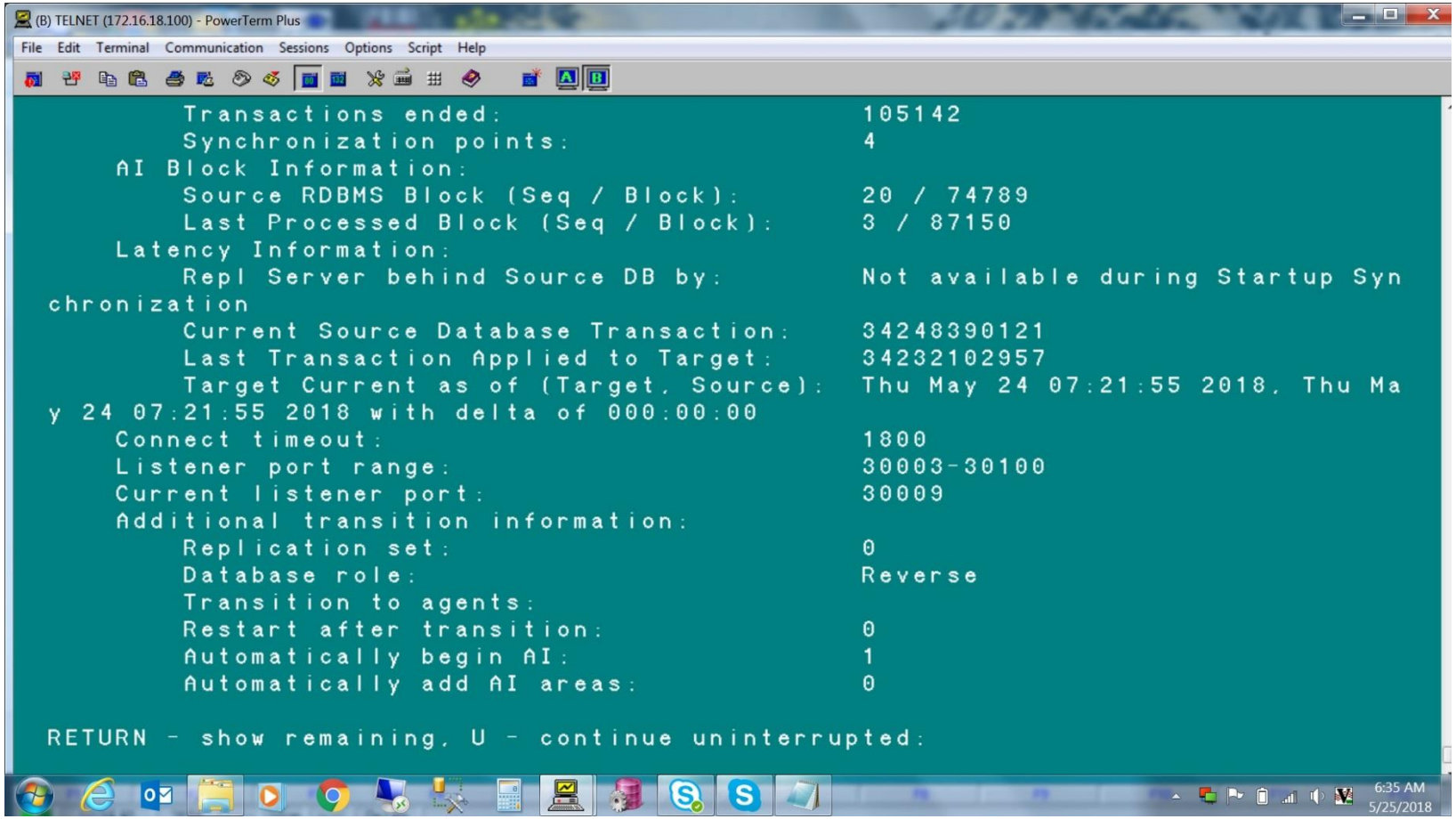
Startup Synchronization



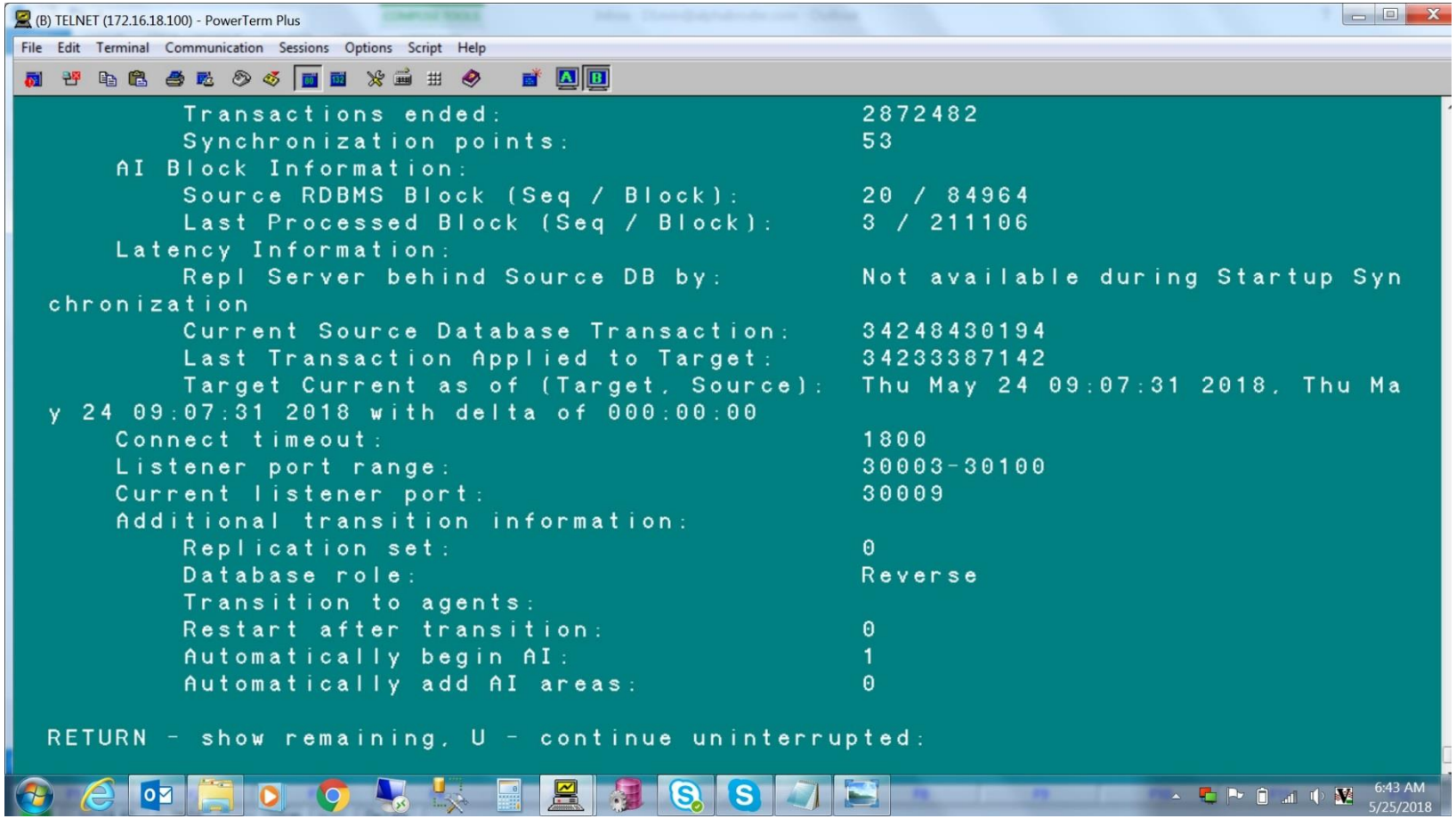
Startup Synchronization



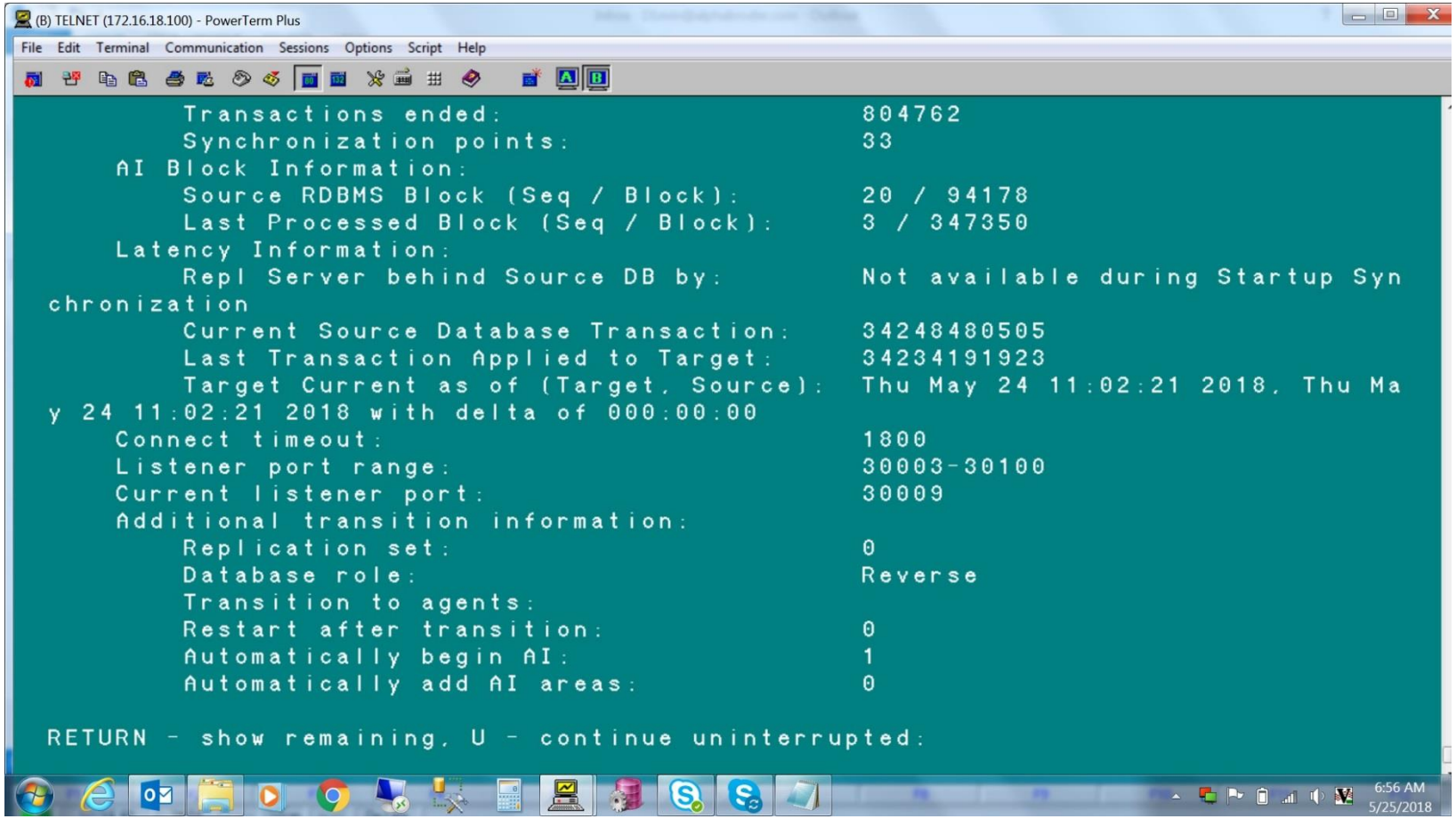
Startup Synchronization



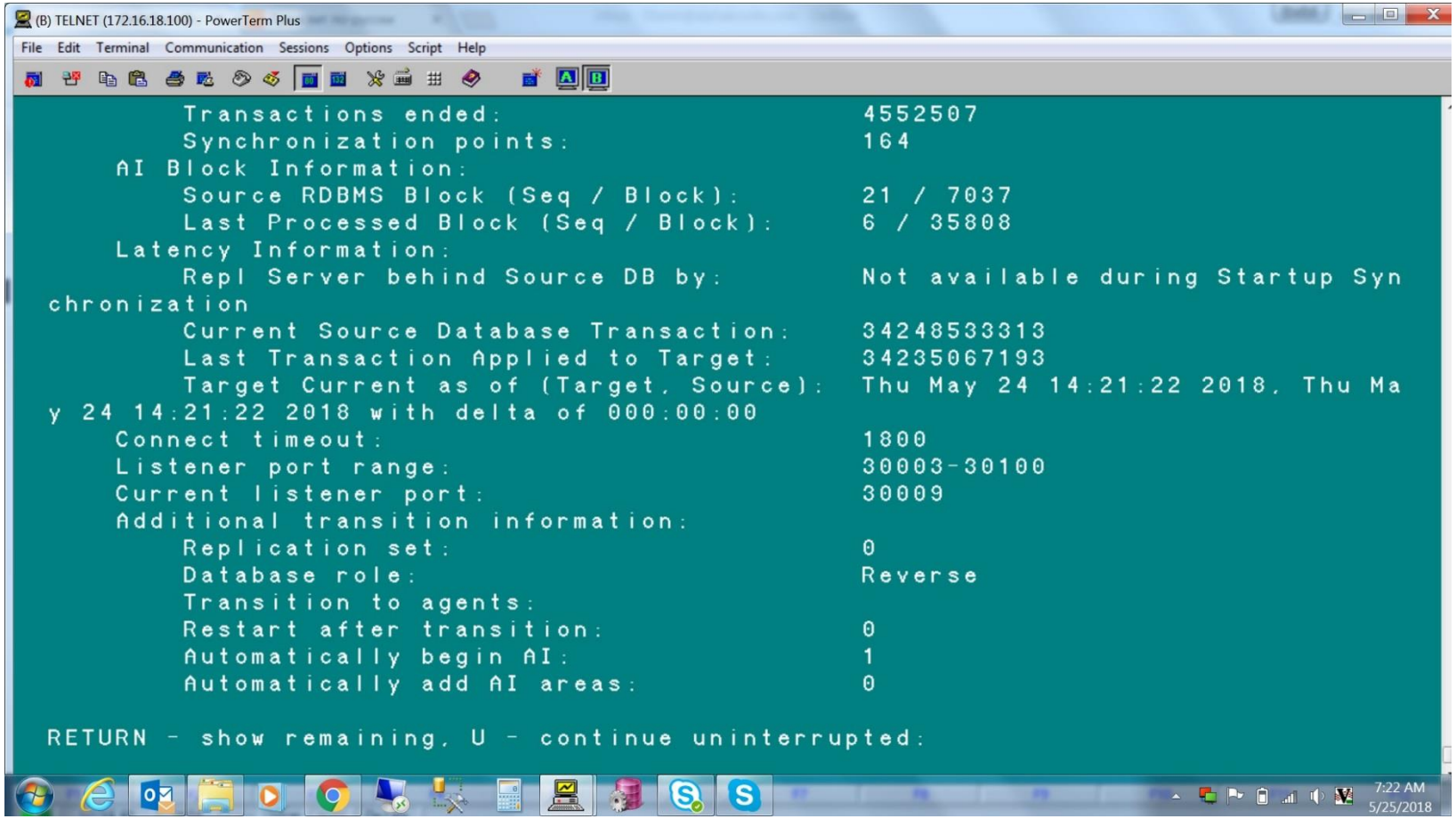
Startup Synchronization



Startup Synchronization



Startup Synchronization



Startup Synchronization

```
Database is enabled as OpenEdge Replication:  Target

Agent:
    Name:                                       imiagent1
    ID:                                         1
    Host name:                                  192.168.10.100
    State:                                      Normal Processing
    Ready:                                      Yes
    Critical:                                   No
    Method:                                     Asynchronous
Agent is waiting for:                           Nothing
Maximum bytes in TCP/IP message:                8512
Server/Agent connection time:                   Fri May 25 03:47:01 2018
Delay Interval (current / min / max):           240 / 5 / 500
Transition information:
    Type:                                       Manual
The last block received at:                     Fri May 25 16:03:01 2018
Activity information:
    Blocks received:                            66
    Blocks processed:                           66
```

A couple OE Replication advices

- After switch database roles do not forget to turn off AI or run archiver on Target (that was Source at some point in time)
- The agent name has a limit of 15 characters

```
[server]
    control-agents=sportsagent1
    database=sports
    transition=manual
```

- Do not run backup before synchronization started
- If you disabled replication, delete the repl.recovery files