

# Getting Started with Informix

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***Advanced DataTools***

# Internet of Things (IoT) Webcasts

1. Introduction to Informix and the Internet of Things – May 26<sup>th</sup>
2. Using Informix TimeSeries and the Internet of Things
3. Running an Informix Database Server on an ARM Computer – June 23<sup>rd</sup>
- 4. Getting Up and Running with Informix – July 28<sup>th</sup>**

# Getting Going With Informix

- What does Informix run on
- Where to get Informix
- Information about Informix
- Pre-Install steps
- Informix installation
- Setting up a basic configuration file
- Starting the engine
- Post-Install steps

# Supported Platforms

|              | Linux    | Windows  | HP-UX        | AIX   | Solaris | MacOSX |
|--------------|----------|----------|--------------|-------|---------|--------|
| ARM          | 32bit    |          |              |       |         |        |
| Intel x86    | 32bit    | 32bit    |              |       |         |        |
| Intel x86_64 | 32/64bit | 32/64bit |              |       | 64bit   |        |
| POWER        | 64bit    |          |              | 64Bit |         |        |
| PA_RISC      |          |          | 64bit (11.7) |       |         |        |
| System Z     | 64bit    |          |              |       |         |        |
| Mac EM64T    |          |          |              |       |         | 64bit  |
| SPARC        |          |          |              |       | 64bit   |        |
| Itanium      |          |          | 64bit        |       |         |        |

# Informix Editions (Free)

- **Developer Edition**
  - Includes most functionality
  - Limits on RAM, CPU and Disk usage
  - Available on most systems
  - Not for production use
- **Innovator-C Edition**
  - Limited to one 1 CPU and 2 GB of RAM
  - No Replication
  - Free for use, no re-distribution allowed
  - Windows, (Intel) Linux and MAC only

# Informix Editions

- **Express Edition**
  - 4 cores, 8 GB RAM max, limits on licensing
  - Most OSes available
- **Workgroup Edition**
  - 16 GB of RAM, Flexible Licensing
  - Most OSes available
- **Enterprise Edition**
  - Licensed by resources on the server
  - Available for all of the listed OSes
  - No software limits on RAM or resources

# Informix Editions

More details on the Informix editions available  
and restrictions:

<http://www.ibm.com/developerworks/data/library/techarticle/dm-0801doe/>

# Version Numbers

Example: **11.70.FC7W1**

**11** : Major Release

**70** : Enhancement Release

**F** : Architecture

F – 64bit, U – Unix 32bit, T- Windows 32bit

**C7** : Subrelease number

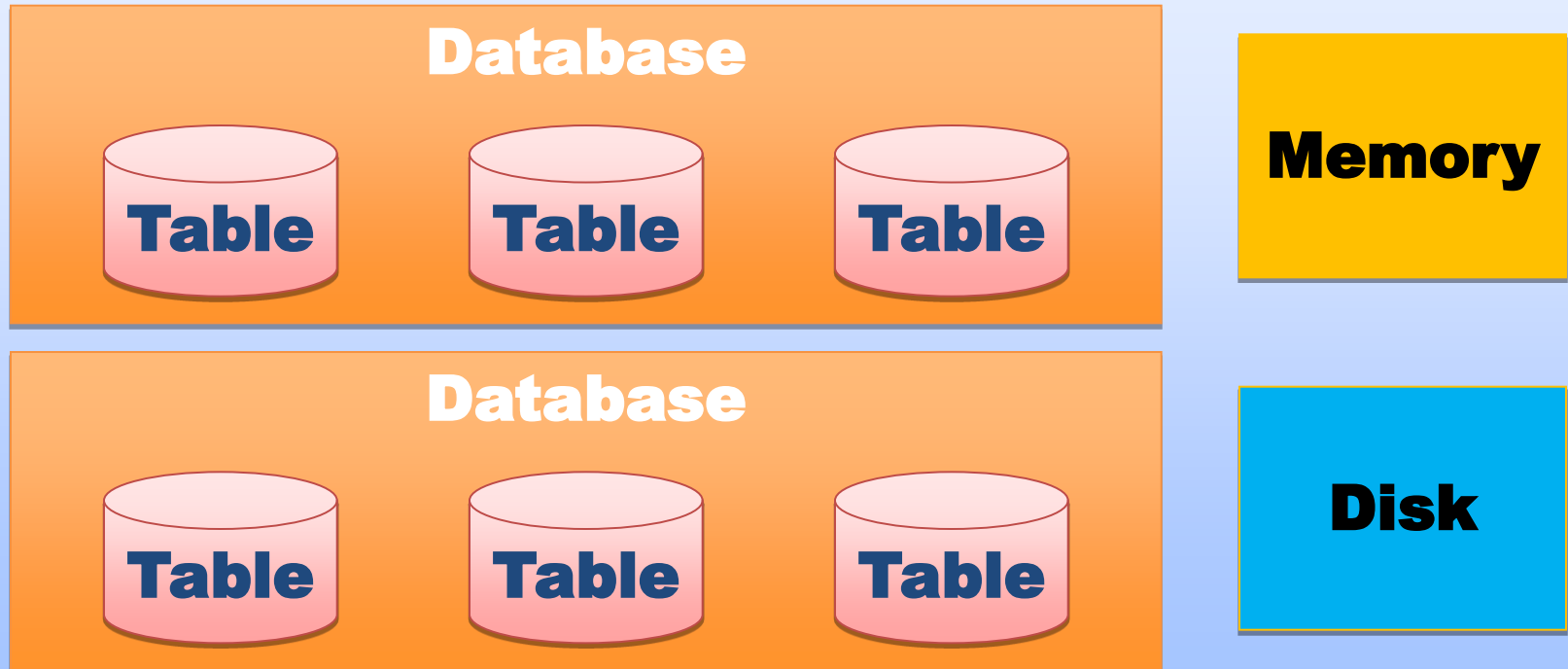
**W1** : Fixpack number



# Informix Terms

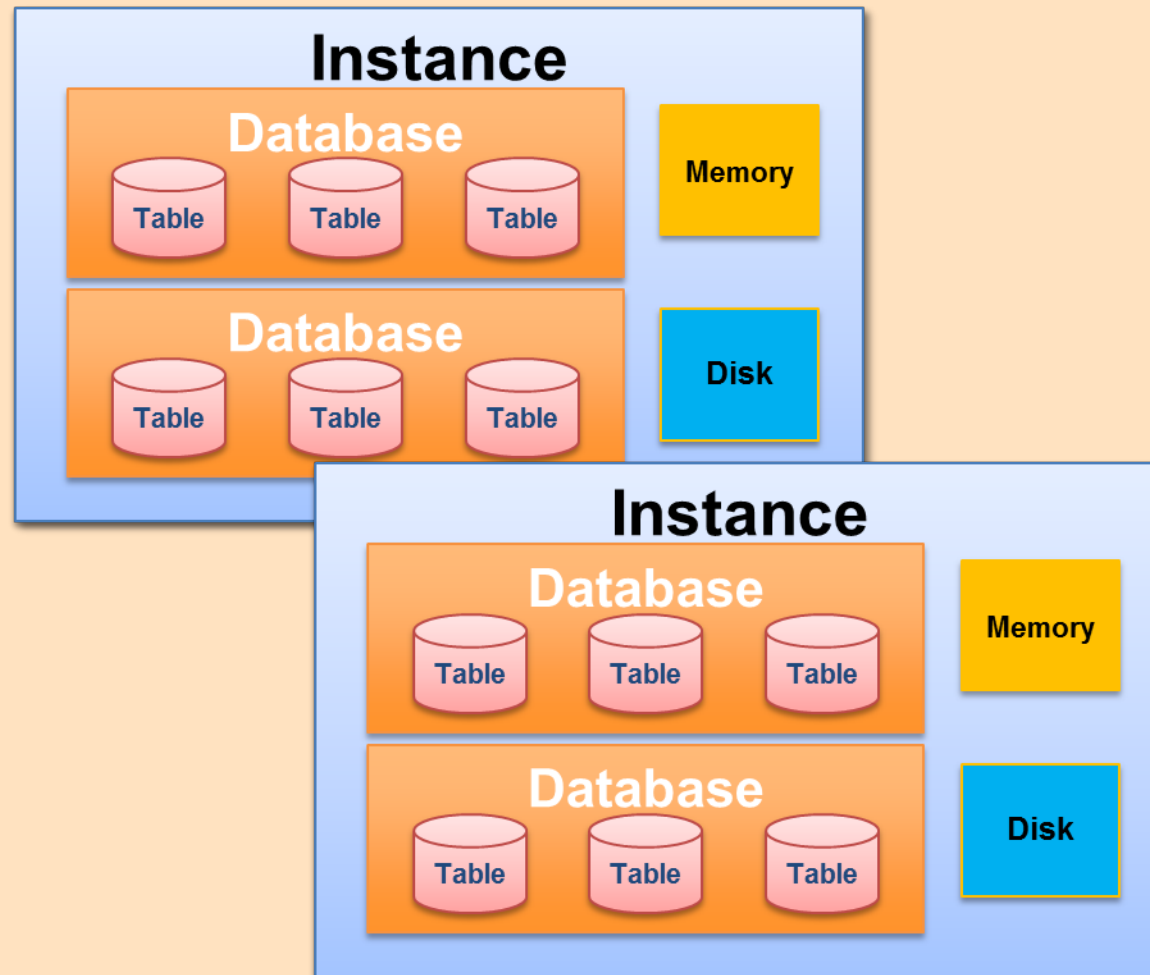
- **Instance** – An individual copy of Informix running on a server, each must have its own unique ID
- **Database** – Container of tables, procedures, and other elements in an instance, owned by a particular user
- **Table** – Container of data living in a database. By default owned by the database owner

# Instance



An ***instance*** is a set of resources (disk and memory) that can be shared by multiple ***databases***

# SERVER

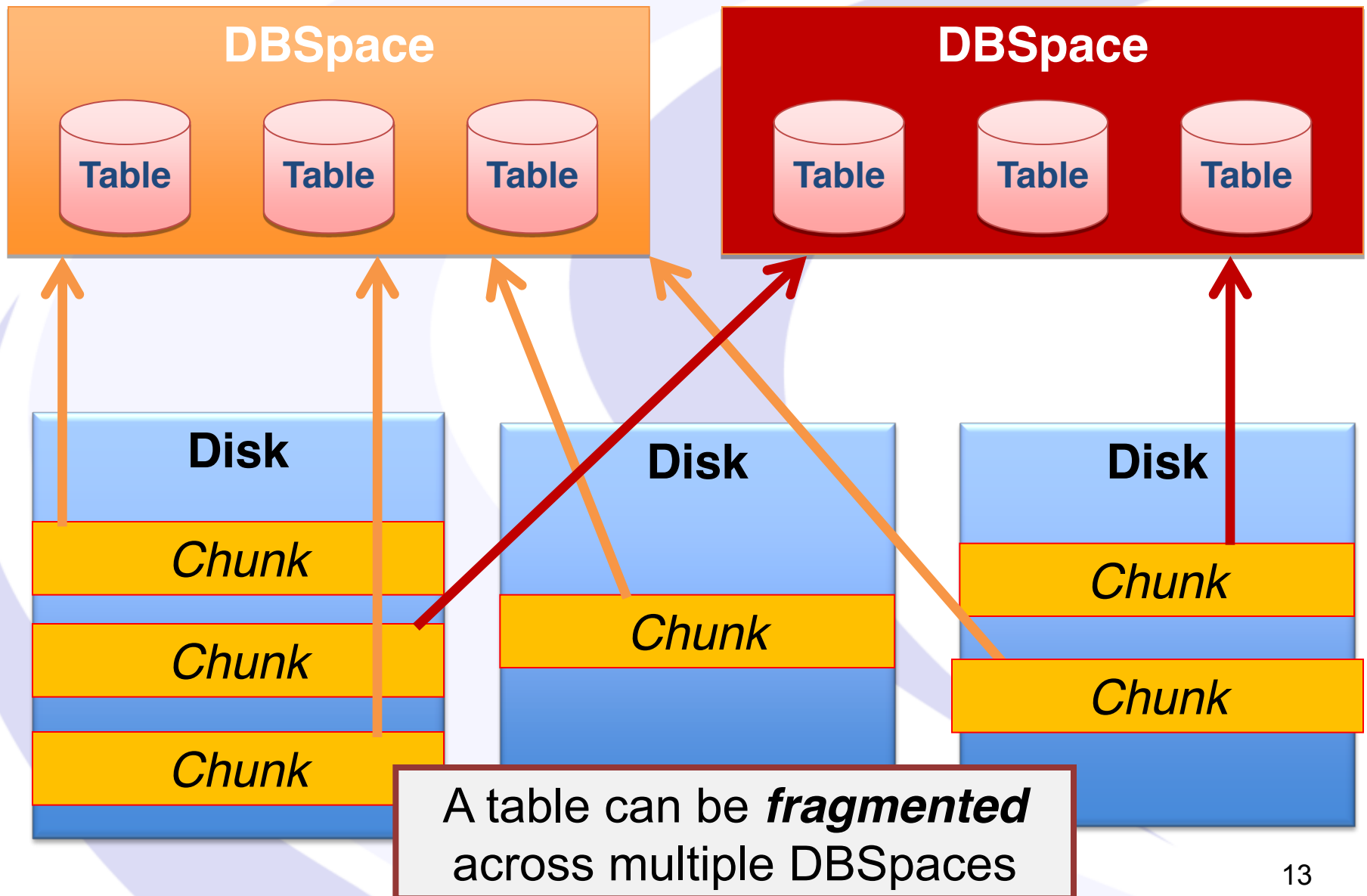


Multiple instances can run on a server, each with their own set of resources

# Space Terms

- **DBSpace** – Set of one or more chunks that store Informix data
- **Chunk** – A file or device pre-allocated for space that make up a DBSpace
- **Bufferpool** – The buffers in memory that hold retrieved data for faster processing

# DBSpace/Chunks



# Informix Commands

|                 |  |
|-----------------|--|
| <b>oninit</b>   | central server application                               |
| <b>onmode</b>   | manages the running engine                               |
| <b>onstat</b>   | gives statistics and information on the current instance |
| <b>ontape</b>   | a backup utility   |
| <b>onspaces</b> | creates/deletes chunks                                   |
| <b>onparams</b> | manages logical and physical logs                        |

# Where To Get Informix

- Download from IBM's website

[www-01.ibm.com/software/data/informix/downloads.html](http://www-01.ibm.com/software/data/informix/downloads.html)

- Requires an IBM login (free)
- IIUG Website

[www.iiug.org](http://www.iiug.org)

# Pre-Install Steps

- Create group “informix”
- Create user “informix”
  - Add user to the informix group
- Set up a directory for Informix
  - Owned by Informix
  - Recommended:  
`/opt/IBM/informix_<version>`  
e.g.: `/opt/IBM/informix_12.4fc4` (*full version #*)
  - Set running directory  
`ln -s /opt/IBM/informix_12.4fc4  
/opt/IBM/informix`



# Run The Installer

- Place downloaded file in a directory
  - This is just for the installation
- Extract the installer .tar.gz or zip file
- `./ids_install`

# Installation Methods

- Run as root
- Command Line
  - Most commonly used on UNIX/Linux systems
  - Number based options
- GUI
  - Most common on Windows and Mac
  - Standard installation prompts
- Options are the same between both types
- Java is required (7 is recommended)
- OpenJDK 6 may not work at all

# Installation Options

- Default Install Folder
  - This is where all of the executable and configuration files will live
- Typical/Custom Install
  - Custom allows you to select more features
- Role separation
  - Splits the administrative tasks into multiple separate groups
- Create a default instance
  - Creates a basic configuration and very basic instance automatically

# Options To Install

- IBM Informix database server
  - Leave selected
- IBM Informix Client SDK
  - Libraries and tools to compile for multiple languages. Used to build language drivers.
- IBM Informix Connect
  - Available for legacy systems
- IBM Informix JDBC
  - JDBC Driver

# Options To Install

- Global Language Support
  - Language files
- IBM OpenAdmin Tool (not available on all platforms)
  - Automatic install of apache/PHP and the OAT scripts

# OAT Options

- Default Hostname
  - Hostname the server will recognize itself as
- Port Number
  - Default port apache will run on
- Enable OAT Password Protection
  - Password protects the administrative pages
- Enter Name/Password
  - Does not work on Linux currently

# Next Steps

- Choose a name for your first instance
  - Example: **'test1'**
- Set up the 'informix' profile

`~informix/.profile` or `~informix/.bash_profile`

```
INFORMIXDIR=/opt/IBM/informix
```

```
INFORMIXSERVER=test1
```

```
ONCONFIG=onconfig.test1
```

```
PATH=$PATH:/opt/IBM/informix/bin
```

```
export INFORMIXDIR INFORMIXSERVER  
ONCONFIG PATH
```

# Informix Environment

- Source the profile to set the environment correctly:

```
. ~informix/.profile
```

- It is important to make sure that the following environment variables are set correctly when running commands against the instance:

**INFORMIXDIR**

**INFORMIXSERVER**

**ONCONFIG**

**PATH**



# Set Up Connectivity

- **sqlhosts** is a configuration file which tells the engine how connections will be made – the protocol, ports, etc.
- It is also used to tell Informix applications where other informix instances are available

# Set Up Connectivity

- As 'informix':

```
cd $INFORMIXDIR/etc
```

```
cp sqlhosts.std sqlhosts
```

- Edit sqlhosts file

# Set up Connectivity - sqlhosts

## The sqlhosts file

Five fields, tab or space separated

1. Service name (test1, test1\_tcp)
2. Protocol onsocket (tcp), onipcshm (shared memory) *[consult documentation]*
3. Hostname/IP to bind to
4. Service name or port number
5. Field for advanced options (*optional*)

# Set up Connectivity - sqlhosts

## #Shared Memory Connection

|       |          |             |                  |
|-------|----------|-------------|------------------|
| test1 | onipcshm | test_server | informix_service |
|-------|----------|-------------|------------------|

## #TCP Connection

|           |          |             |                  |
|-----------|----------|-------------|------------------|
| test1_tcp | onsoctcp | test_server | informix_service |
|-----------|----------|-------------|------------------|

## #Remote Server

|           |          |              |                    |
|-----------|----------|--------------|--------------------|
| test2_tcp | onsoctcp | test2_server | test2_service_port |
|-----------|----------|--------------|--------------------|

□

# Set Up ONCONFIG

- The ONCONFIG file is the master configuration file for the engine
- Contains many parameters
- Some settings can be changed dynamically after the instance is running (consult the documentation)

# Set Up ONCONFIG

- As user 'informix':

```
cd $INFORMIXDIR/etc
```

```
cp onconfig.std onconfig.test1
```

- The name of the file needs to match the value of the \$ONCONFIG environment variable

# Key ONCONFIG Parameters

*Will discuss just a few of the many settings...*

|                    |  |
|--------------------|--|
| <b>ROOTPATH</b>    | Path to the root DBSpace                           |
| <b>ROOTSIZE</b>    | Size of the first rootdbs chunk                    |
| <b>ROOTOFFSET</b>  | Offset on disk, set 0 if using cooked files        |
| <b>LOGFILES</b>    | Don't touch this - it will be dynamically adjusted |
| <b>MSGPATH</b>     | Path to server log                                 |
| <b>DBSPACETEMP</b> | Name of the default temp DBSpace                   |

# Key ONCONFIG Parameters

|                        |   |
|------------------------|---|
| <b>DBSERVERNAME</b>    | Shared memory instance name 'test1'   |
| <b>DBSERVERALIASES</b> | Name(s) of aliases, use at least the tcp port name from sqlhosts ( <i>test1_tcp</i> ) |
| <b>FULL_DISK_INIT</b>  | If you need to re-initialize the instance to a factory default, set it to 1           |



# Key ONCONFIG Parameters

|                    |  |
|--------------------|--|
| <b>SHMVIRTSIZE</b> | Size in KB given to the engine at start time   |
| <b>SHMADD</b>      | New memory block size.   |
| <b>SHMTOTAL</b>    | Maximum size of memory to use, 0=unlimited   |
| <b>TAPEDEV</b>     | Device/File/Directory ontape uses to backup - /dev/null for fake backups                         |
| <b>LTAPEDEV</b>    | Device/File/Directory ontape uses to backup logical logs - /dev/null to discard the logical logs |

# BUFFERPOOL

- Parameter(s) in the ONCONFIG file specifying the amount of memory allocated to a cache of data
- Need one bufferpool for tables using the default page size (2 KB or 4 KB depending on the OS)
- Add lines for each additional bufferpool for tables with other page sizes

# BUFFERPOOL

- Default line is the template for new bufferpools

- Version 12:

```
BUFFERPOOL size=page_size,memory=memory_size
```

- Earlier Versions:

```
BUFFERPOOL size=4k,buffers=10000,lrus=8,lru_min_dirty=50,lru_max_dirty=60
```

|                    |   |
|--------------------|---|
| <b>Size</b>        | Page size buffer, check version info  |
| <b>Buffers</b>     | Number of buffers of page size  |
| <b>LRUs</b>        | Number of queues to handle buffers  |
| <b>LRU min/max</b> | Threshold of dirty pages for when to start writing out pages to disk between checkpoints and when to stop |

# Allocating Space

- Create a directory to store your dbspaces or links to them
- Change owner of directory to informix:informix
- Change the permission to 770
- Create files for storage (these will become the chunks)
- Change owner of files to informix:informix
- Change the permission to 660

# Root DBSpace

The root DBSpace is a critical storage space

Example of creating the root space chunk:

```
mkdir /informixchunks  
chown informix:informix /informixchunks  
chmod 770 /informixchunks  
touch /informixchunks/rootdbs  
chown informix:informix /informixchunks/rootdbs  
chmod 660 /informixchunks/rootdbs
```

*This path and filename must match the value of  
**ROOTPATH** in the **ONCONFIG***

# Get Going!

**oninit -iv**

|        |                            |
|--------|----------------------------|
| oninit | The control process        |
| -i     | Initializes a new instance |
| -v     | Verbose                    |
| -y     | Respond yes automatically  |

Messages will be displayed during startup. Look for:

**Verbose output complete: mode = 5**

# Get Going!

**onstat -**

```
IBM Informix Dynamic Server  
Version 12.10.FC4 -- On-Line --  
Up 00:00:50 -- 1182476 Kbytes
```

**The Informix instance is now up and running!**

# Allocating Space

- Follow the procedure earlier to create more files as chunks for additional DBSpaces
- Create files for the chunks
  - tmpdbs
  - logdbs
  - datadbs



# Creating Chunk Files - Example

```
cd /informixchunks  
touch logdbs  
touch tmpdbs  
touch datadbs  
chmod 660 *dbs  
chown informix:informix *dbs
```

# onspaces

- Now that the instance is online, and files have been created, add additional DBSpaces with the **onspaces** command

# onspaces

## onspaces

- c create
- d *<dbspace>* dbspace name
- s *<size>* size in bytes
- o *<offset>* offset
- p *<path>* full path to file

*The offset is used if using a raw device.  
For cooked files it generally should be 0*

# Create DBSpaces - Example

```
onspaces -c -d logdbs -o 0 -s 200000 -p  
/informixchunks/logdbs
```

-t option to specifies a temporary DBSpace

```
onspaces -c -d tmpdbs -t -o 0 -s 200000  
-p /informixchunks/tmpdbs
```

```
onspaces -c -d datadbs -o 0 -s 500000 -  
p /informixchunks/datadbs
```

# Next Steps

- Populate a sample database
- Grant user access
- Run queries
- Test the instance

# Restart the Instance

- A restart is sometimes required to make some configuration changes active
- Shutdown the running instance:

```
onmode -kuy
```

- Startup the instance:

```
oninit -v
```

# Create a Sample Database

- As user informix, execute **'dbaccessdemo'**
- Creates the *stores\_demo* database
- When prompted, answer 'N' to installing sample scripts
  - Copies a series of C scripts to the current directory

# Connect To The Database

## dbaccess

Curses based tool for executing SQL and simple administration

- Select '**Database**'
- Select '**Select**'
- Choose '**stores\_demo@test1**'
  - Opens the stores\_demo database
- '**Exit**' out of that menu



# Connect To The Database

- 'Query-language'

- 'New'

- Type:

```
select * from items
```

- Hit 'Esc' *[Done Editing]*

- 'Run'

- Browse the data

- Choose 'Exit' to back out of the menus,  
then the tool

# User Access

From dbaccess:

```
grant connect to <user>
```

```
grant dba to <user>
```

```
grant select on items to tom
```

- Informix users the underlying operating system authentication
- OAT has a very nice management tool

# Connecting Applications

- INFORMIXSERVER = test1\_tcp
- Service = Port Number (9088)
- Hostname = <*server name/IP*>
- User = User Account

# Add Logical Logs

Add additional logical logs to store transactional information

onparams

|                           |              |
|---------------------------|--------------|
| -a                        | add          |
| -d <i>&lt;dbspace&gt;</i> | dbspace name |
| -s <i>&lt;size&gt;</i>    | size in KB   |

```
onparams -a -d logdbs -s 50000
```

# What is Next?

- Backup the system files
- Set up backups, both of logical logs and the instance itself
- Set up startup and shutdown scripts
- Load your data
- Tune the engine parameters
- Set up replication (*optional*)

# Open Admin Tool

GUI tool for Informix Administration  
Configure/monitor Informix from a browser

The screenshot displays the OpenAdmin Tool web interface. The top navigation bar includes a search field and a server address: `sheldon_top@172.16.100.147`. The left sidebar contains a menu with categories like Health Center, Alerts, Dashboard, Health Advisor, Logs, Task Scheduler, Space Administration, Server Administration, Replication, Performance Analysis, SQL ToolBox, and SQL Explorer. The main content area is divided into several panels:

- Table Filters:** A tree view showing the database structure, with `testdb` selected.
- Information:** Details for the `sensordb` database, including owner (`informix`), created date (`2015-01-17`), and space occupied (`9.2 MB`).
- TimeSeries Subtypes:** A table listing time series subtypes and their columns.
- Containers:** A table listing containers and their associated time series.
- Calendars:** A table listing calendars and their patterns.
- Tables and Indexes:** A table listing tables and indexes.

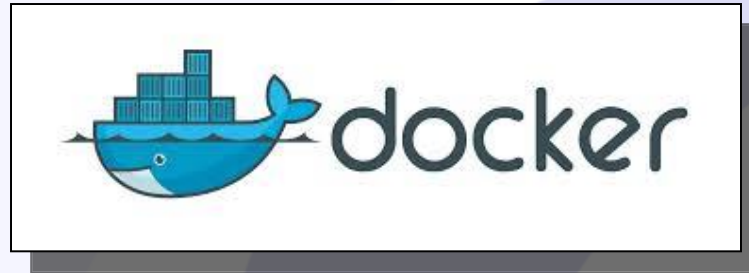
| TimeSeries          | Columns                                     |
|---------------------|---|
| sensor_reading      | timestamp DATETIME, temperature DEC         |
| tscontainerwindow_r | timestamp DATETIME, partition UDTVAR        |
| ts_packed_rowtype_t | ts_packed_timestamp DATETIME, ts_packed_int |

| Container        | Dspace    | TimeSeries     | Regular |
|------------------|-----------|----------------|---------|
| sensor_container | sensordbs | sensor_reading | ✓       |

| Calendar  | Pattern Start       | Pattern      | Interval |
|-----------|---------------------|--------------|----------|
| ts_1min   | 2011-01-01 00:00:00 | 1 on         | Minute   |
| ts_15min  | 2011-01-01 00:00:00 | 1 on, 14 off | Minute   |
| ts_30min  | 2011-01-01 00:00:00 | 1 on, 29 off | Minute   |
| ts_1hour  | 2011-01-01 00:00:00 | 1 on         | Hour     |
| ts_1day   | 2011-01-01 00:00:00 | 1 on         | Day      |
| ts_1week  | 2011-01-02 00:00:00 | 1 on         | Week     |
| ts_1month | 2011-01-01 00:00:00 | 1 on         | Month    |
| ts_1year  | 2011-01-01 00:00:00 | 1 on         | Year     |

| Name                      | Owner    | Type  |
|---------------------------|----------|-------|
| sensor                    | informix | Table |
| tscontainerwindowtable    | informix | Table |
| tscontainerwindowtable_pk | informix | Index |

# Informix Install - Docker Container



- Informix is available as a Docker Container for simple setup

<https://registry.hub.docker.com/u/ibmcom/informix-innovator-c/>

- Innovator-C Edition
  - Free to use
  - Limited to 1-core, 2 GB memory

# Links

- Informix Versions:  
<http://www.ibm.com/developerworks/data/library/techarticle/dm-0801doe/>
- IIUG Website:  
<http://www.iiug.org/>
- Informix Downloads:  
<http://www.ibm.com/software/data/informix/downloads.html>
- Informix Documentation:  
<http://www-01.ibm.com/software/data/informix/library.html>
- Docker Site:  
<https://registry.hub.docker.com/u/ibmcom/informix-innovator-c/>
- Advanced DataTools Training:  
<http://advanceddatatools.com/Training/InformixTraining.html>



# Questions?



Send follow-up questions to  
[tom@advanceddatatools.com](mailto:tom@advanceddatatools.com)

# Next Webcast

***Moving from 4GL to Genero***

**Date: September 22**

**Time: 2:00pm EST**

# Informix Training in 2015

- October 12-15, 2015
  - **Informix for Database Administrators**
- All courses can be taken online on the web from your desk or at our training center in Virginia.
- We guarantee to *NEVER* cancel a course and will teach a course as long as one student is registered!



# Thank You

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