

# Supporting Global Production Environments with Ingres®

“The Ingres Conference”

November 10, 2004

## Abstract

This presentation is based off of a project of ours that had the requirements of supporting business in both the Americas and Asia/Pacific regions on a single physical system. There were requirements for both single-byte and double-byte support on a single system, along with support for multiple languages. There were a fair number of challenges with regard to configuration and implementation.

We will focus on our specific implementation, providing detail on some of the more critical aspects of the project.

## Biography

- Chip Nickolett, President
- Comprehensive Consulting Solutions, Inc.

Chip is the founder of Comprehensive Solutions ([www.Comp-Soln.com](http://www.Comp-Soln.com)), was a Senior Consultant for the Ingres Products division of the ASK Group, and was both a Consultant and Consulting Manager for Computer Associates. He has been working with the Ingres product since 1986, and is a past President of the North American Ingres Users Association.

## Biography

- Peter Gale, Principal Consultant
- Comprehensive Consulting Solutions, Inc.

Peter has been an independent consultant since 1989 and has worked with Ingres since 1991 providing DBA services and training to a wide variety of clients and industries throughout the UK and Europe. Peter is now part of the team working on the migration and support of Global System we are talking about today.

## About Comprehensive Solutions

- Founded in March, 1999
- We provide a unique service of 24x7 DBA support to clients and sites globally
- Our team consists of highly skilled Consultants with a wide variety of experiences and diverse backgrounds, each with a long history of using Ingres products
- Customer satisfaction and philanthropic support of various causes are our principle sources of motivation
- We have several free white papers and tools available on our website

## Topics of Discussion

- Setting the Scene
- The Challenges
- How the systems were configured
- Environment set-up
- Migrating data
- Cron jobs
- Checkpoints and maintenance
- Summary
- Q & A

## Setting the Scene

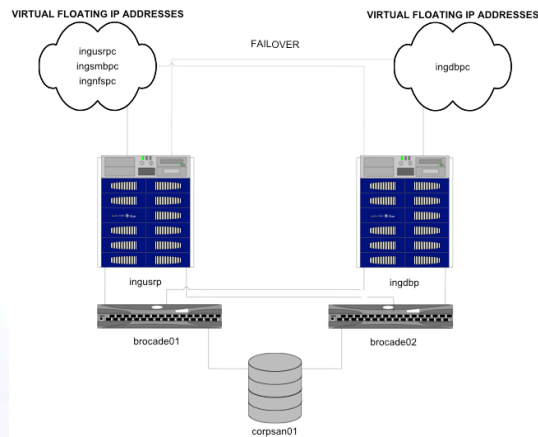
- Users in 9 countries
  - Australia, Far East, UK and USA
- Servers in 5 countries
- Migrating all databases and users to a Solaris Cluster in the USA
- Single Client/Server pair (identically configured for failover) to support 5 regional databases
- 5 Time zones
- 4 languages
- Server to run on Pacific Time

## The Challenges

- Multiple Languages/Character Sets
  - Two installations
    - Single Byte supporting ISO88591
    - Double Byte supporting CHINESES, KANJIEUC and ISO88591
- Job Scheduling across multiple time zones
  - Daylight Saving = variable time differences
- Maintenance Scheduling
  - Very small 'window' for backups and maintenance
- Protecting the databases
  - Ensuring the right settings are used at all times

# System Configuration

## SUN Production Ingres Cluster Layout



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# Environment Setup

- We implemented a consistent configuration (physical layout) between both installations
- Directories for the Asia/Pacific Ingres installation have a "-AP" suffix and reside on separate physical devices
- The 'ingres' user does not own any production databases
- Nothing runs from the DBA accounts
- Our goal is to maintain the same versions and patch levels between SGL and DBL environments
- Environment variables are very important!

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# Environment Setup

PG1		PG2		PG3		PG4		PG5	
R1	R1	R1	R1	R1	R1	R1	R1	R1	R1
1:12	ingckp8d (16.25 GB)	1:1B	ingckp7d (16.25 GB)	1:24	ingckp6d (16.25 GB)	1:2D	ingckp5d (16.25 GB)	1:36	ingckp4d (16.25 GB)
14	ingdata1d (16.25 GB)	1D	ingdata2d (16.25 GB)	25	ingdata3d (16.25 GB)	2F	ingdata4d (16.25 GB)	38	ingdata5d (16.25 GB)
17	ingckp8 (9.75 GB)	20	ingckp7 (9.75 GB)	29	ingckp6 (9.75 GB)	32	ingckp5 (9.75 GB)	3B	ingckp4 (9.75 GB)
19	ingleta1 (9.75 GB)	22	ingleta2 (9.75 GB)	28	ingleta3 (9.75 GB)	34	ingleta4 (9.75 GB)	3D	ingleta5 (9.75 GB)
1:1A	ingdata1-AP (5 GB)	1:23	ingdata7-AP (5 GB)	1:2C	ingdata6-AP (5 GB)	1:35	ingdata5-AP (5 GB)	1:3E	ingdata4-AP (5 GB)
6B	ingckp1-AP (5 GB)	69	ingckp2-AP (5 GB)	6A	ingckp1-AP (5 GB)	6B	ingckp1-AP (5 GB)	6C	ingckp5-AP (5 GB)

PG6		PG7		PG8		PG9		PG10	
R1	R1	R1	R1	R1	R1	R1	R1	R1	R1
1:3F	ingckp3d (16.25 GB)	1:48	ingckp2d (16.25 GB)	1:51	ingckp1d (16.25 GB)	1:70	ingset-AP (4 GB)	1:79	ingset2d (4.75 GB)
40	49	49	49	52	52	71	ingset-AP (4 GB)	7A	ingset1d (4.75 GB)
41	ingdata5d (16.25 GB)	4A	ingdata7d (16.25 GB)	53	ingdata8d (16.25 GB)	72	ingset1 (3.5 GB)	7B	ingset1_3d (4.75 GB)
42	4B	4C	4C	54	54	73	ingset2 (2.5 GB)	7C	ingset1-AP (4 GB)
7:43	7:43	7:43	7:43	1:55	1:55	74	ingset3 (3 GB)	7D	ingset13-AP (4 GB)
44	ingckp3 (9.75 GB)	4D	ingckp2 (9.75 GB)	56	ingckp1 (9.75 GB)	75	ingset4 (3.25GB)	7E	ingset11 (6.5 GB)
45	4E	4E	4E	57	57	76	ingset5 (6.5 GB)	7F	ingset3 (6.5 GB)
46	ingleta6 (9.75 GB)	4F	ingleta7 (9.75 GB)	58	ingleta8 (9.75 GB)	77	ingset6 (6.5 GB)	80	ingset2 (6.5 GB)
7:47	ingdata3-AP (5 GB)	1:50	ingdata2-AP (5 GB)	1:59	ingdata1-AP (5 GB)	1:78	ingset-AP (9.75GB)	1:81	ingset14 (6.5 GB)
8D	ingckp5-AP (5 GB)	8E	ingckp7-AP (5 GB)	8F	ingckp6-AP (5 GB)	1:82	ingtmp (chunk #1..4.4 GB)	1:83	ingset5 (2 GB)
								1:84	ingset5dc (2 GB)

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# Environment Setup

- Database creation in the double-byte environment needs to be carefully performed because the language and collation sequences are going to be different for the various databases.
- Make sure II\_SYSTEM and PATH are properly set
- `ingsetenv II_CHARSETxx <language>`
- `createdb <normal options>`
- Reset `II_CHARSETxx` and `II_DATE_FORMAT`

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# Environment Setup

## **Important Caveat!**

Unless you are using a Unicode installation (something in our future) the supported method is to have one language used per installation. There are potential data corruption issues if you combine languages in a single installation as we have.

Extensive validation on the storage and retrieval of the production data we use (English, Kanji, and Simplified Chinese) has been performed. Addition of new languages (such as Korean) could potentially cause problems and needs to be carefully managed.

# Environment Setup

**Environment variables** control behavior, data format and logic. Need to be set specifically for each user.

- II\_CHARSETxx
  - Alters the behaviour of string operations
  - Must be set correctly for every Database access to avoid corruption
- II\_TIMEZONE\_NAME and TZ
  - Ensures correct date/time handling
  - Auto adjusts for Daylight Saving
- II\_DATE\_FORMAT

## Environment Setup

Other environment variables that will likely need to be set for each individual user based on their language and regional requirements.

- II\_MONEY\_FORMAT
- II\_MONEY\_PREC
- II\_DECIMAL
- II\_APPLICATION\_LANGUAGE

## Protecting the Databases

- Bullet proof environment needed to ensure data integrity
  - Standard shell script written to enforce correct variable settings
- Huge Shell script conversion program
- Lock down of database permissions to control access
- Keep the Asia/Pacific and Americas environments separate both with separate Ingres installations and with separate Unix groups (directory and file permission exclusive to a single group)

## Migrating Data

- ASCII vs. Binary
  - Binary easiest and safest way to ensure that data remains the same (use when possible)
  - Biggest concern with ASCII reloads is causing the dates to be different due to incorrect timezone settings
- Issues with dates, money, caution about float precision (both defaults and during validation)
- Wrapper scripts were used to control the environment and manage disk utilization during the process

## Cron Jobs

- Cron schedules start using local server time (Pacific)
  - Most jobs running Mon-Fri in the Asia/Pacific region are scheduled to start Sun in the US
  - End of Month (EOM) scheduling a little trickier due to the global nature of the environment
  - Requirements to run on certain days of the month (such as the last Friday if the EOM occurs over the weekend)
- Setting timezone within script once executing to use a "local" timezone for the running process

## Cron Jobs

- Cron schedules using local server time (Pacific)
  - Jobs running Mon-Fri in Aus may be scheduled Sun-Thu
- Daylight Saving Headache
- US and AUS use DST
- Japan, Hong-Kong, Taiwan do not.
- Switch to/from DST causes 1 or 2 hours change in time difference
- Need to maintain multiple crontab files
  - 3 For Australia
  - AUS switches to DST on the same day as US
  - AUS switches FROM DST 1 week earlier than US

## Cron Jobs

- DST Scheduling Headache
  - Job needs to run at 18:00 Mon - Fri Australia Time
  - Time difference is 19 hours
  - November to March job scheduled for 23:00 Sun-Thu PST
  - DST change over cause a day shift as well
    - Australia goes +1 hour
    - US goes -1 hour
    - Difference now +17
  - April to October Job scheduled for 01:00 Mon - Fri PST

## Cron Jobs

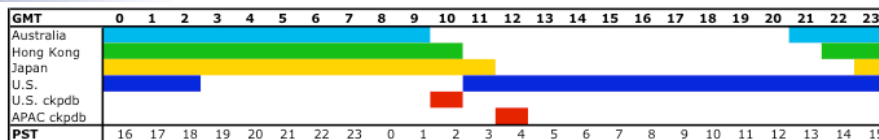
```
# Runs on the 1st only (-W 1)
00 11 28-31 * * /AP/JPN/bin/eom_orders.ksh -d
apacprod:proddb_jpn -s live -l JPN -W 1

# Runs only on weekdays
10 08 * * * /AP/JPN/bin/insert_exch_rate_hist.ksh -d
apacprod:proddb_jpn -s live -l JPN -W WEEKDAY

# Runs on the last workday of the month
00 23 25-31 * * /AP/JPN/bin/customer_loc_outsales.ksh
-d apacprod:proddb_jpn -s live -l JPN -W LASTWORKDAY
```

## Checkpoints & Maintenance

- Scheduling issues - There is a lot of overlap
- Inevitable impact
  - Concurrent activity
  - Checkpoints - Parallel checkpoint to disk with in-line compression (very CPU intensive)



## Summary

We are currently supporting the Americas in one installation (II) and Australia and Japan (Kanji) on a second double-byte installation (AP). Performance is excellent, stability and reliability has been very good, and the users in all regions have experienced an increase in performance. In January we will be migrating Hong Kong (English) and Taiwan (simplified Chinese). While supporting these multiple environments on a single platform increases complexity it has proven to be a great way to share resources and maximize the ROI on this project.

## Questions & Answers

