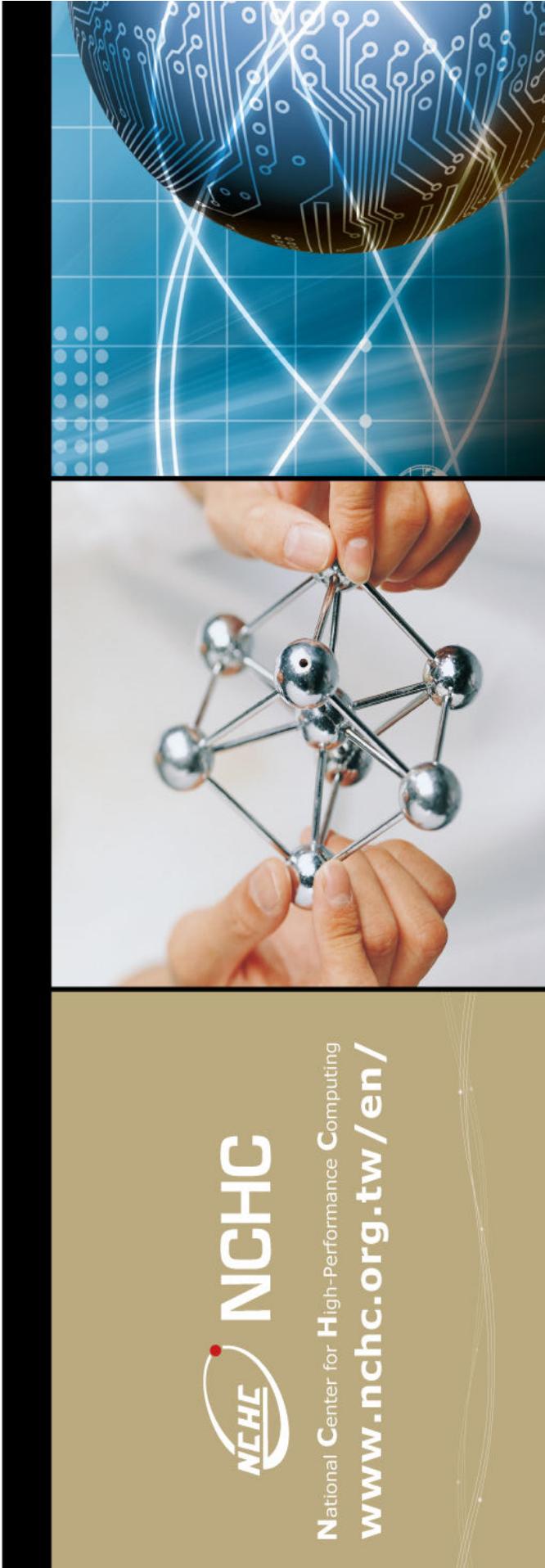


3D-GIS TAIWAN PLATFORM AND NCHC WMS CLOUD FOR DISASTER MONITORING AND ASSESSMENT

Presenter: Jo-Yu Chang (常若愚)

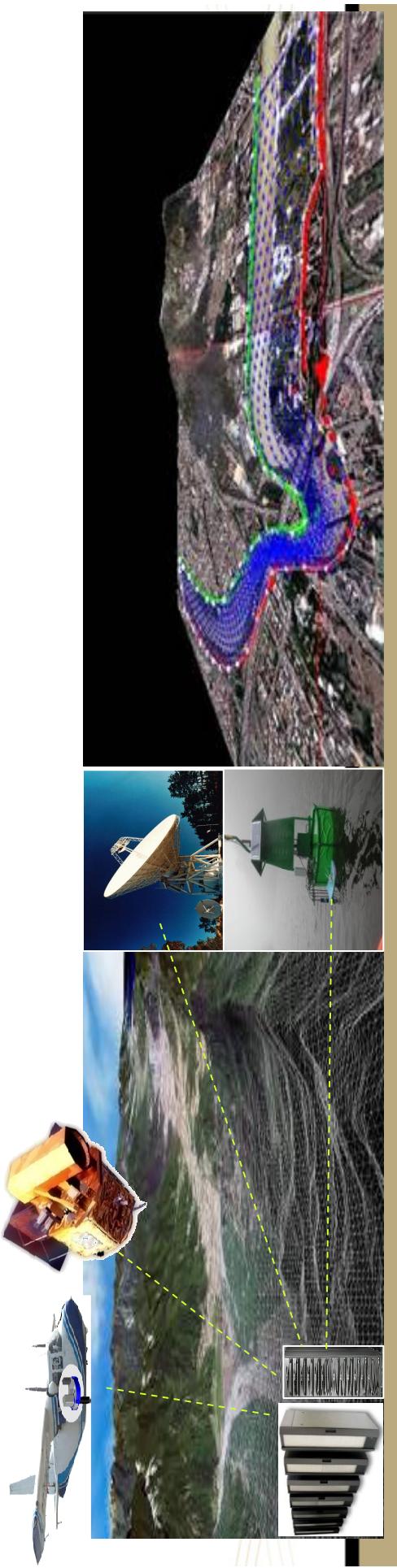
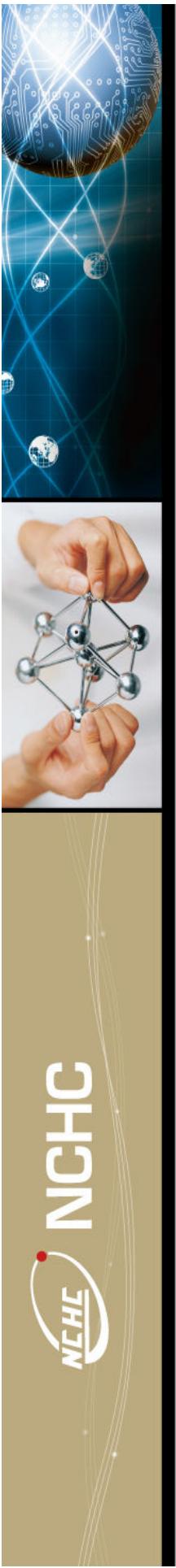
*Jo-Yu Chang stoca@nchc.narl.org.tw
Whey-Fone Tsai wfttsai@nchc.narl.org.tw*

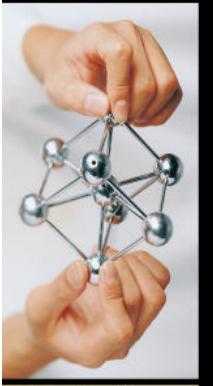
Taiwan, NCHC, Grid Application Division.



Outline

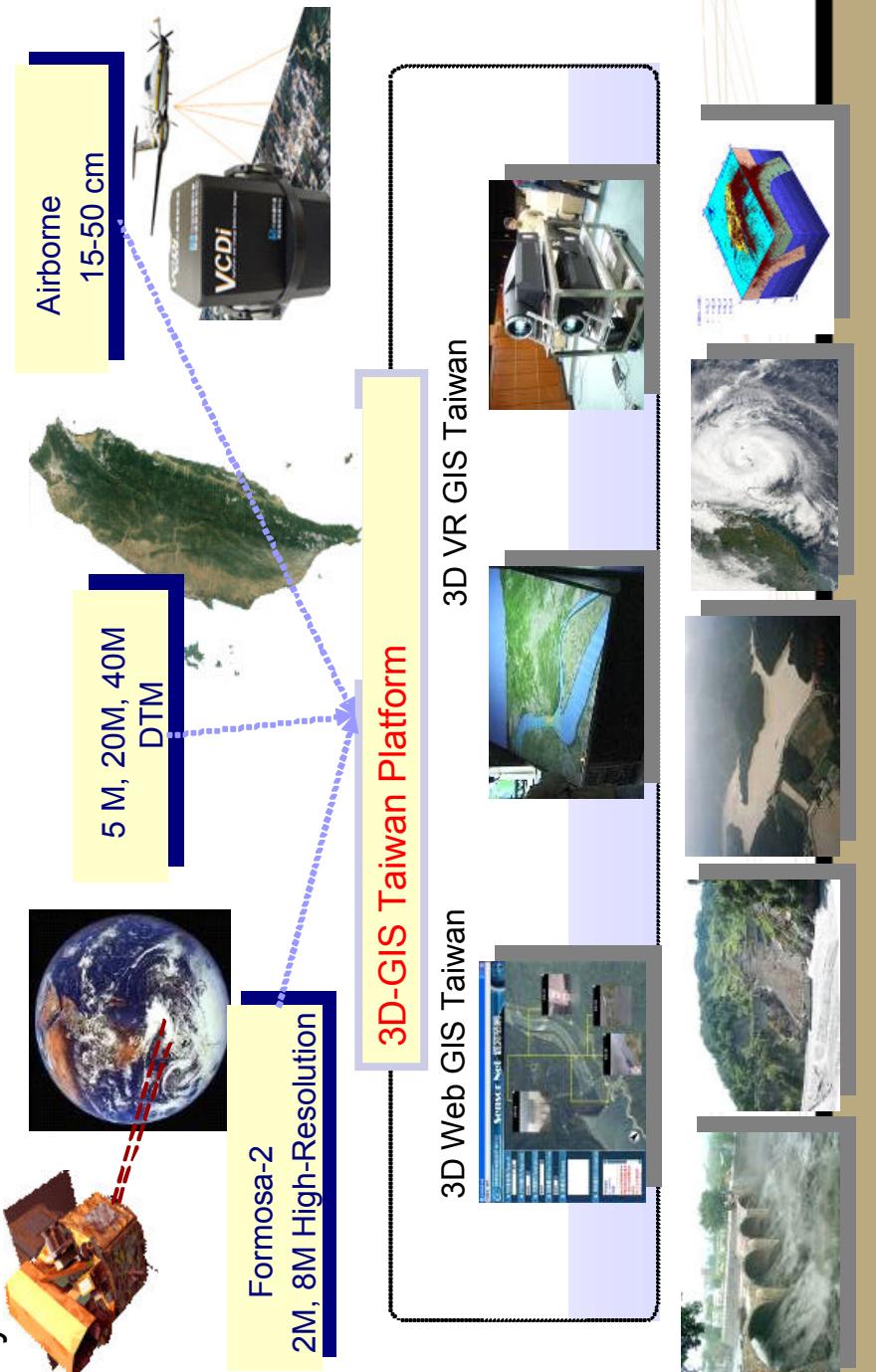
- Introduction to NARL 3D GIS Taiwan Project
- 3D GIS Taiwan Platform (World Wind Taiwan)
- NCHC WMS Cloud Service
- Use Case: Typhoon Nanmadol (disaster drill)
- Concluding Remarks

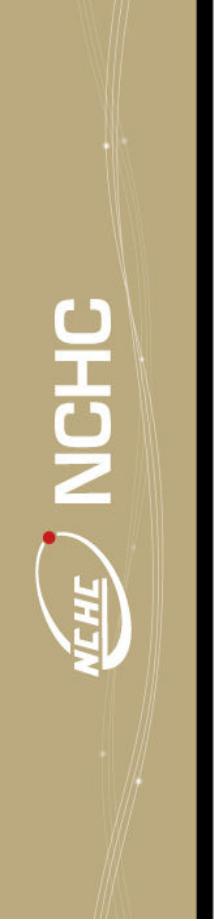
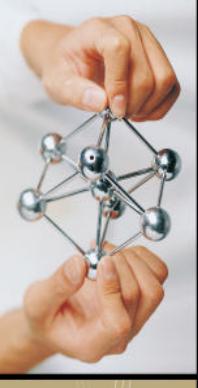




3D-GIS Taiwan Project Overview

- The Primary purpose of the project is created a 3D-GIS platform provides for advance environmental monitoring and disaster reduction in Taiwan.
- Customized application modules for disaster monitoring and assessment.
- basic Image data : Formosa-2 2M/8M satellite images、20cm/5M/20M/40M DTM form Ministry of Interior.





Objective

Development of Near Real-time, High-resolution, Global Earth Observation 3D GIS Platform for Disaster Monitoring and Assessment

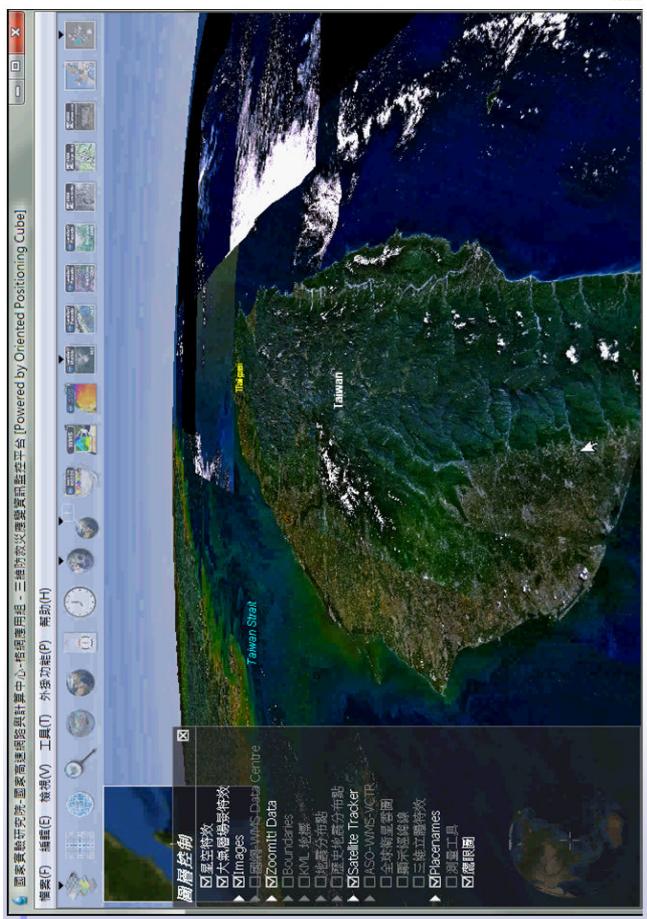
Technology Developments

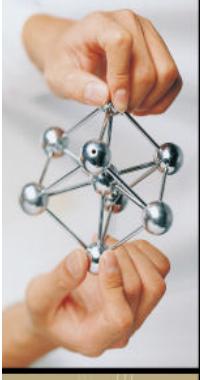
- Integration Multi-scale global earth observations
- Development of advanced 3D GIS display systems
- Development of **Web 3D GIS platform & WMS Cloud service**
- Development of a near real-time image processing for disaster decision support.

3D-GIS Taiwan Platform

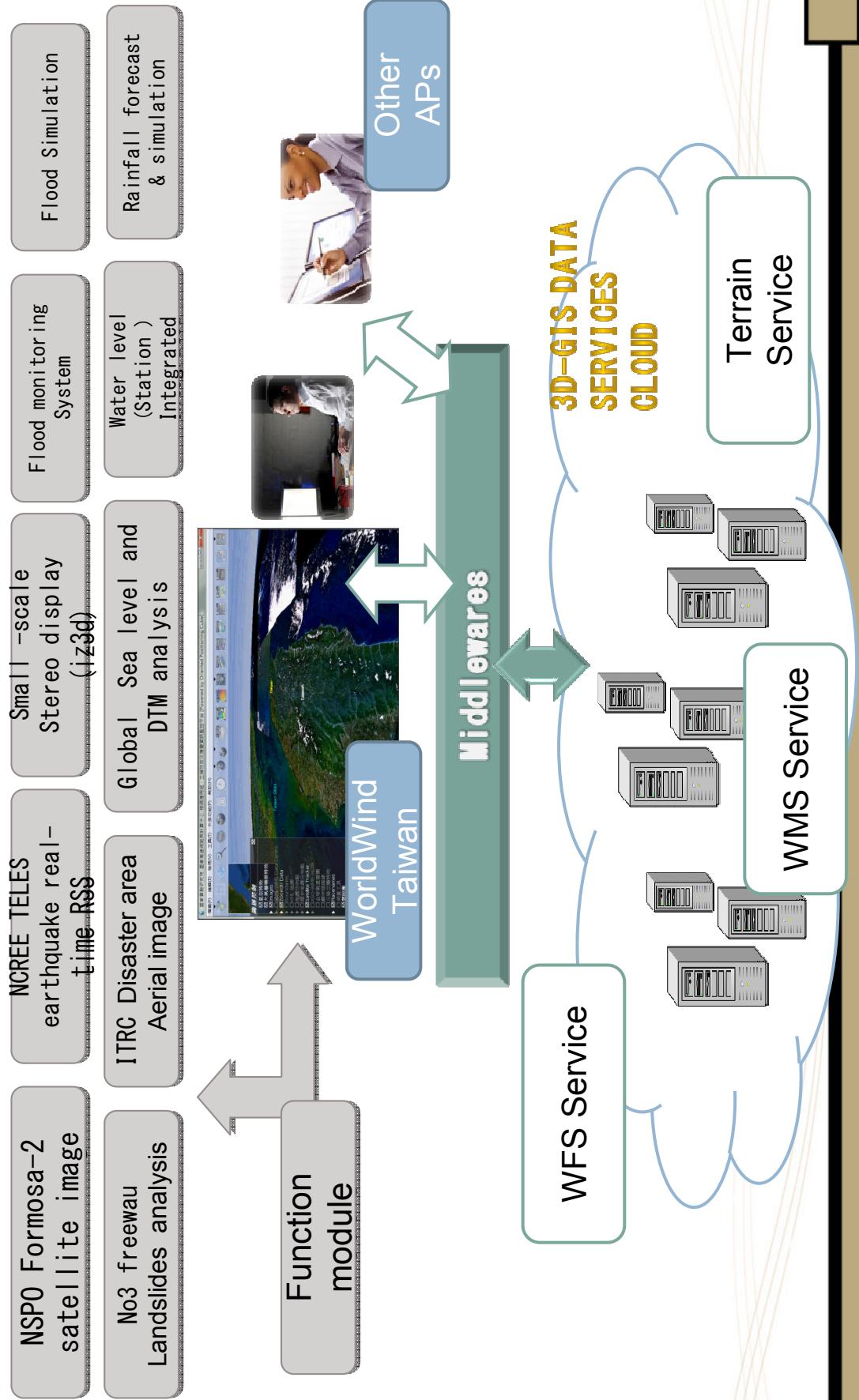
World Wind Taiwan

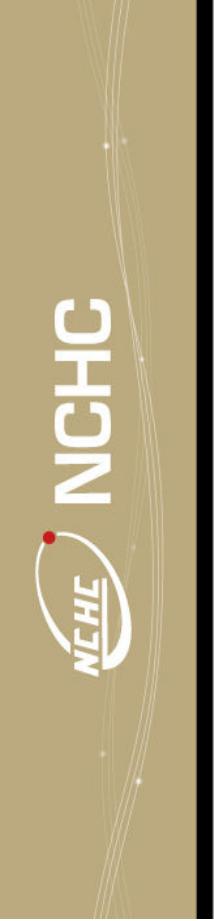
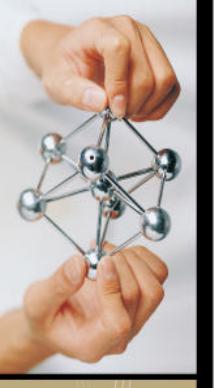
- Developed by modification of NASA World Wind system (Open Source).
- Support OGC standard, WMS、WFS、WCS, etc.; Coupled with Cloud service.
- Encompassing Formosat-2 space borne and airborne images incorporated with data warehouse/fusion and high-performance visualization technologies.
- Linking with end-user disaster prevention database, sensor network, and analyzed model for decision support to disaster assessment and scenario identification.





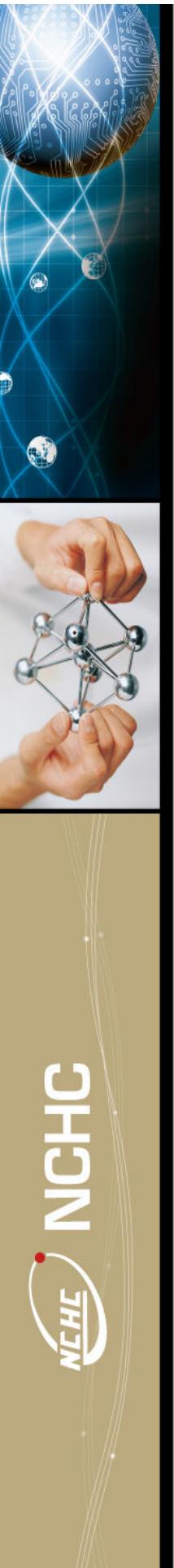
Service Flow & Function Modules



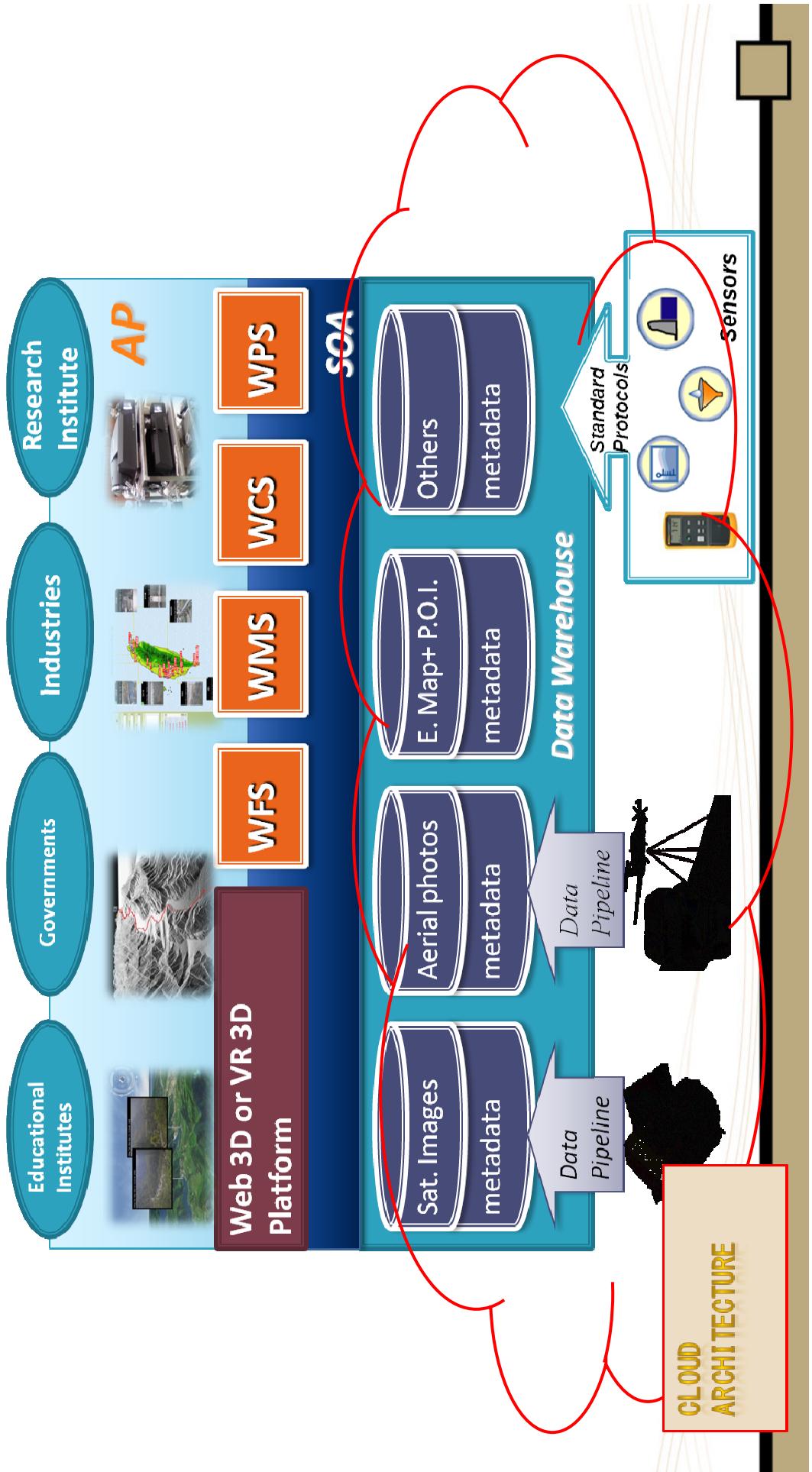


WMS Image sources

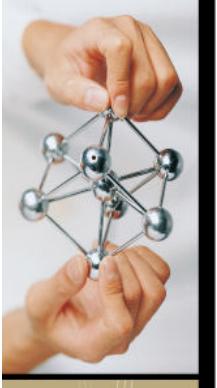
- National Space Organization(NSPO)
 - Satellite images from FORMOSAT-2
 - Resolution: 2 or 8 meters
 - Frequency: overpass Taiwan 2 times/day
 - Aerial Survey Office
 - Aerial images from airplanes or UAV
 - Resolution: 50 cm or higher (25cm~)
 - Frequency:
 - Plain area: 2 times/year
 - Mountainous area: 1 time/ 2 years
- Sensor Data, Photos, E-MAP.
- Total Data Size: ~18TB (126 WMS image layers)



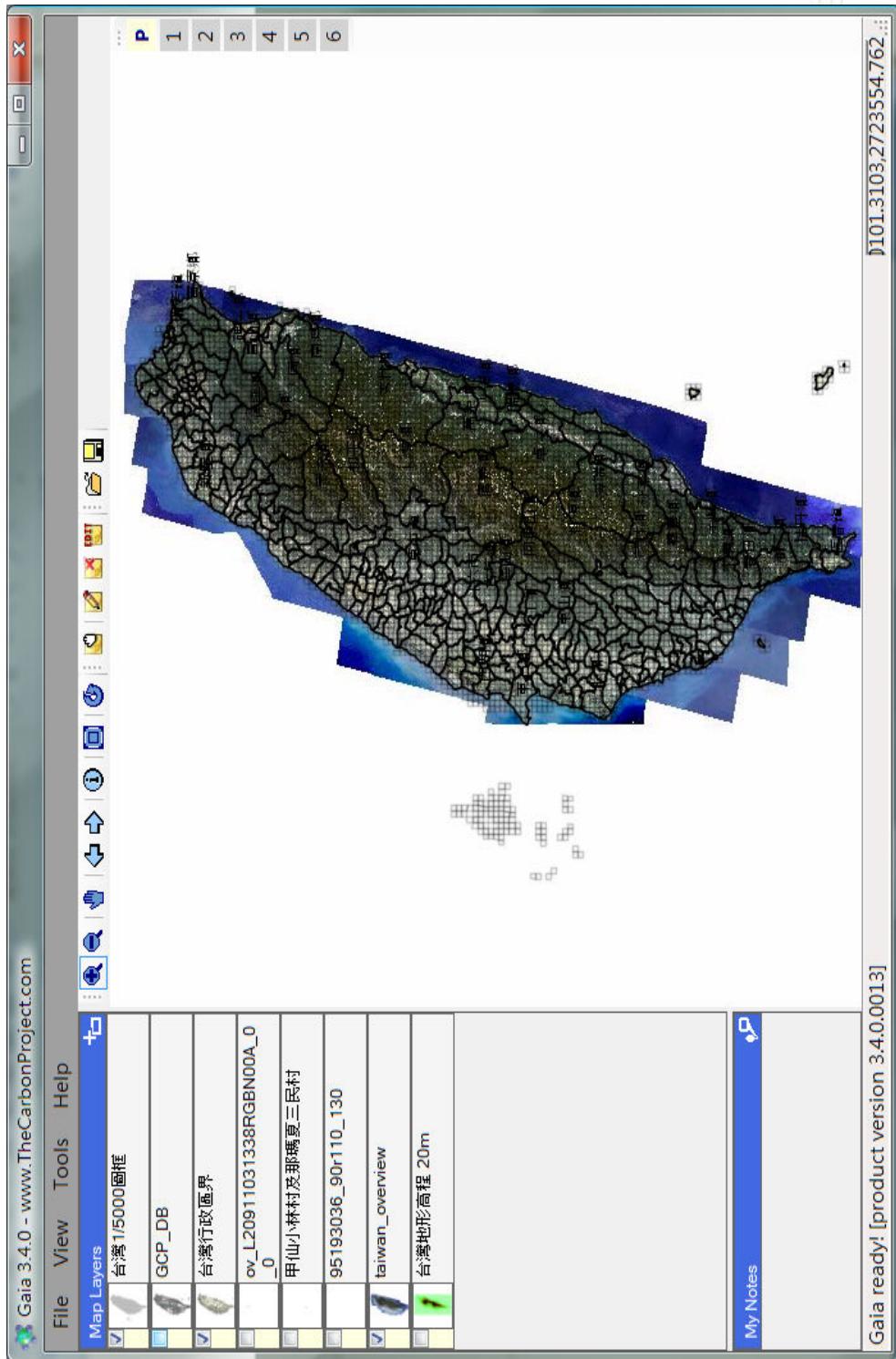
Remote Sensing Data & NCHC WMS Cloud Architecture

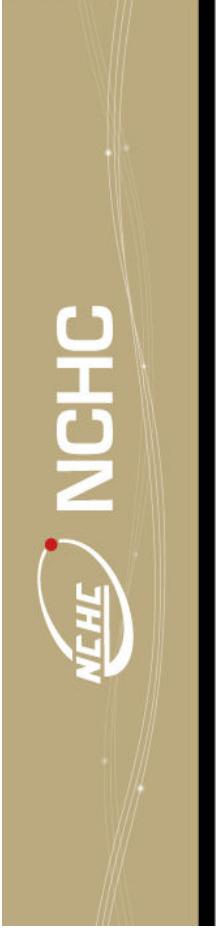
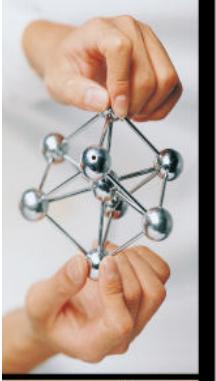


NCHC



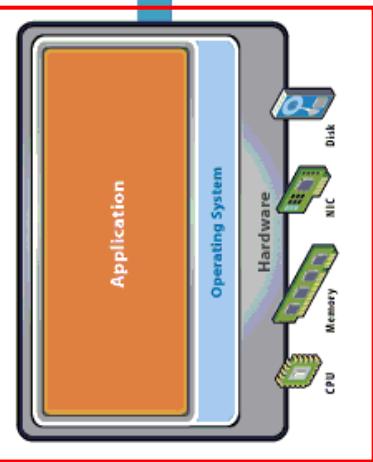
NCHC WMS Cloud – Preview by Gaia software





NCHC WMS Cloud : VM Prototype (original)

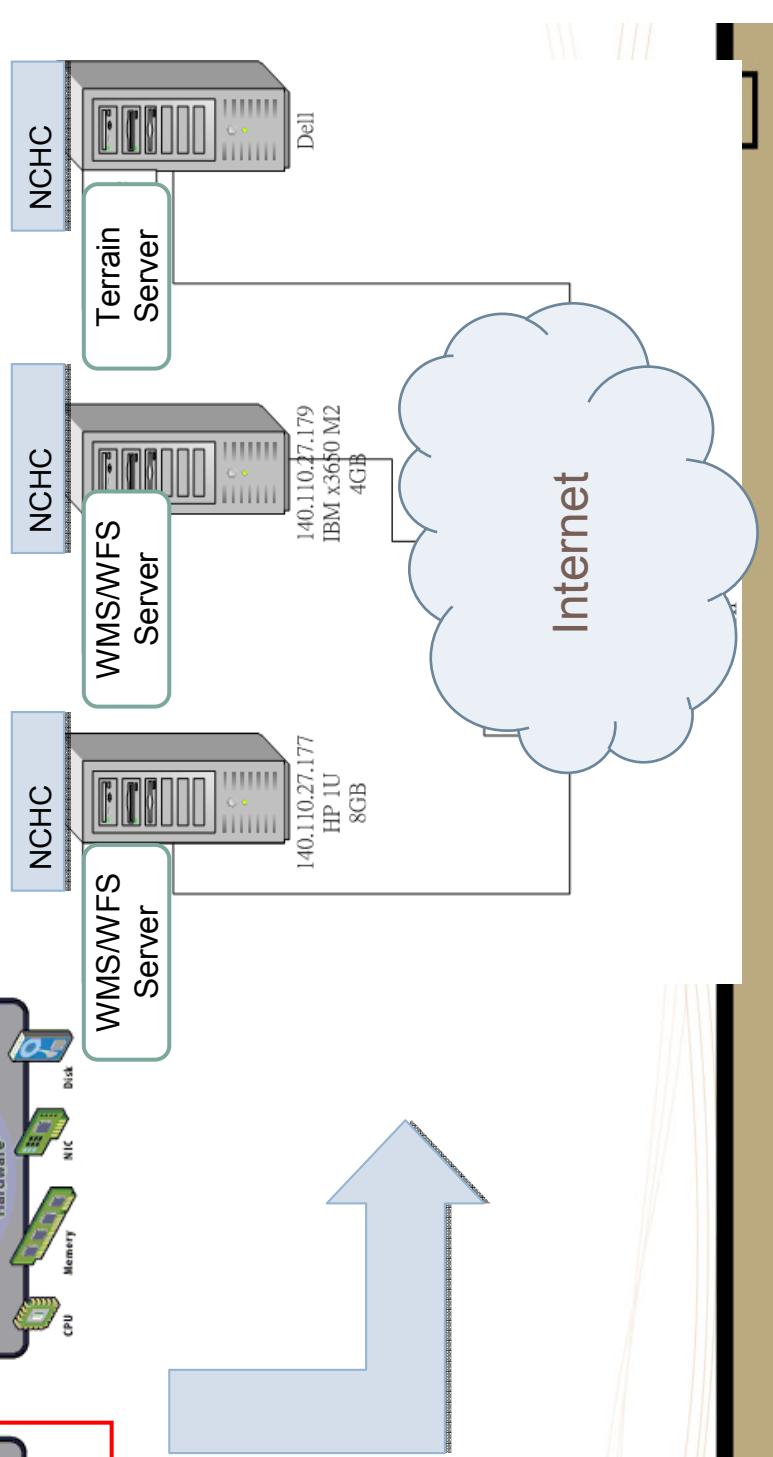
Without Virtualization

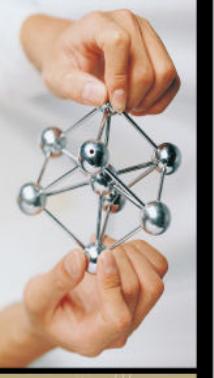


With Virtualization



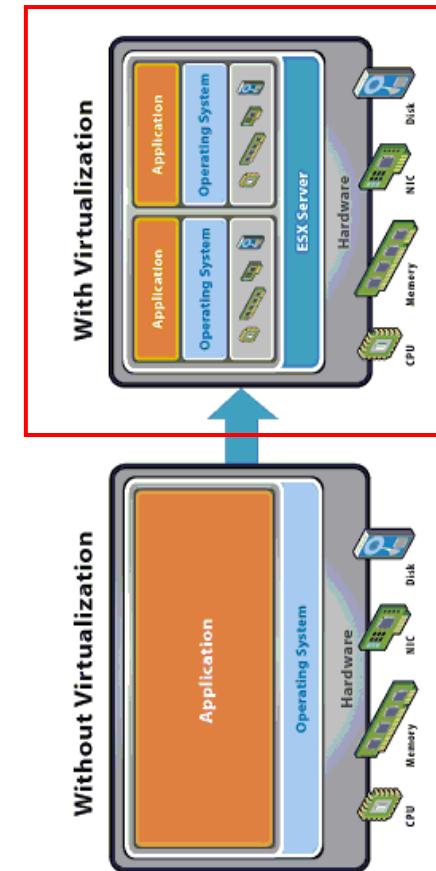
- Each “Service” current users: 30
- Server Resource utilization: ≈ 45%



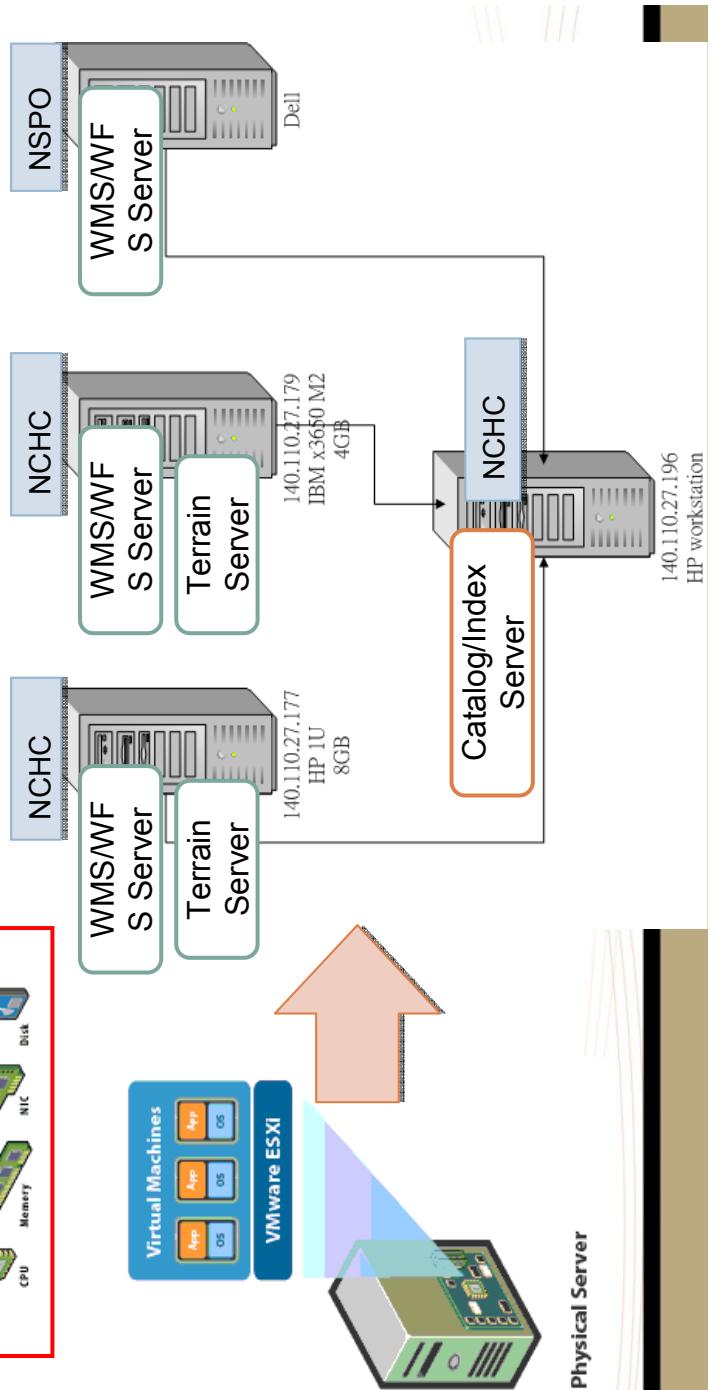


NCHC WMS Cloud : VMware solution

(VMWare vSphere & ESXi)



- Each “service” current users: 30
- Add VM service to each server
- Server Resource utilization: ≈90%
- Every server can support almost 2~3 VM in it, depend on server’s resource (CPU & memory).



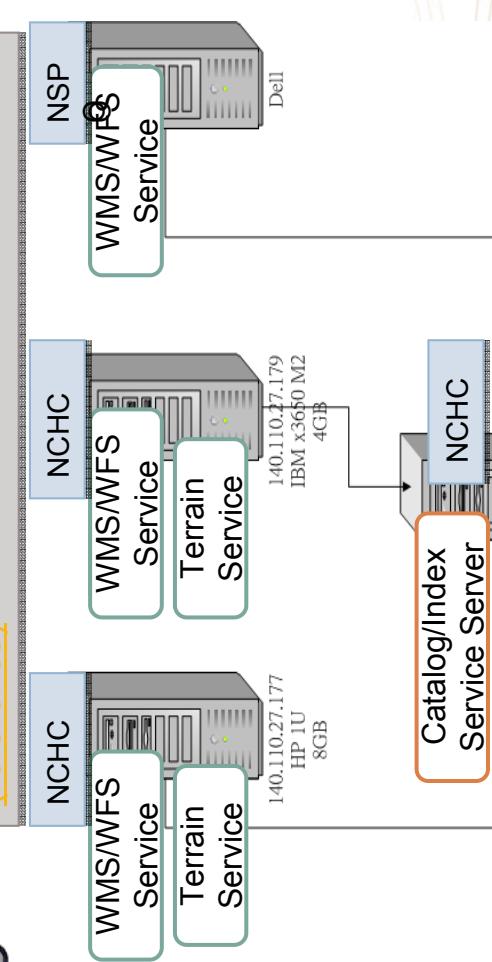
Using “Virtualization” in improving the efficiency and availability of IT resources and applications, and to eliminate the old “one server, one application” model and run multiple virtual machines on each physical machine.

NCHC WMS Cloud : VM Prototype

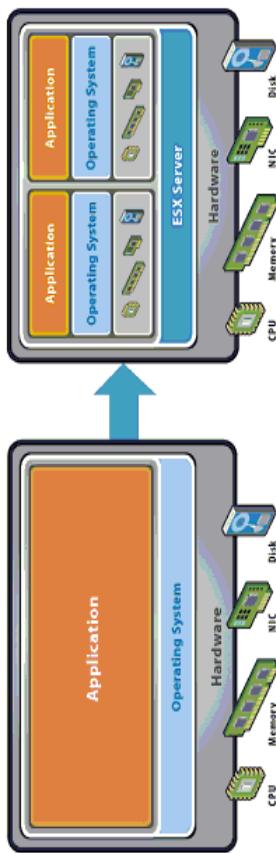
VMware vSphere 5 admin. client ([refer.](#))



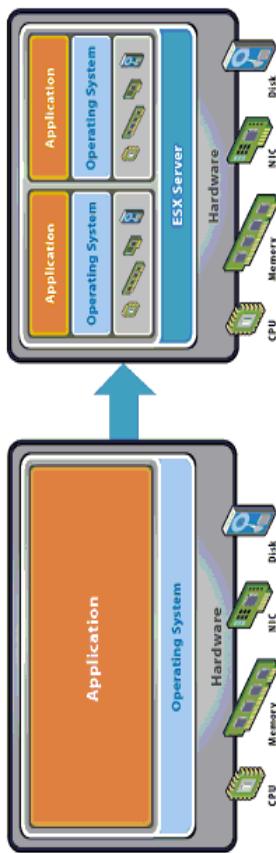
Virtual Machine: Vmware ESXi 5 hypervisor
(reference)

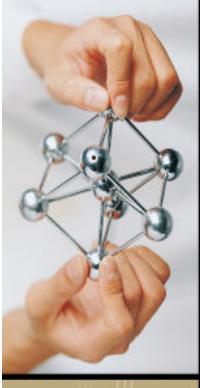


Without Virtualization



With Virtualization





NCHC WMS CLOUD - Single Entry

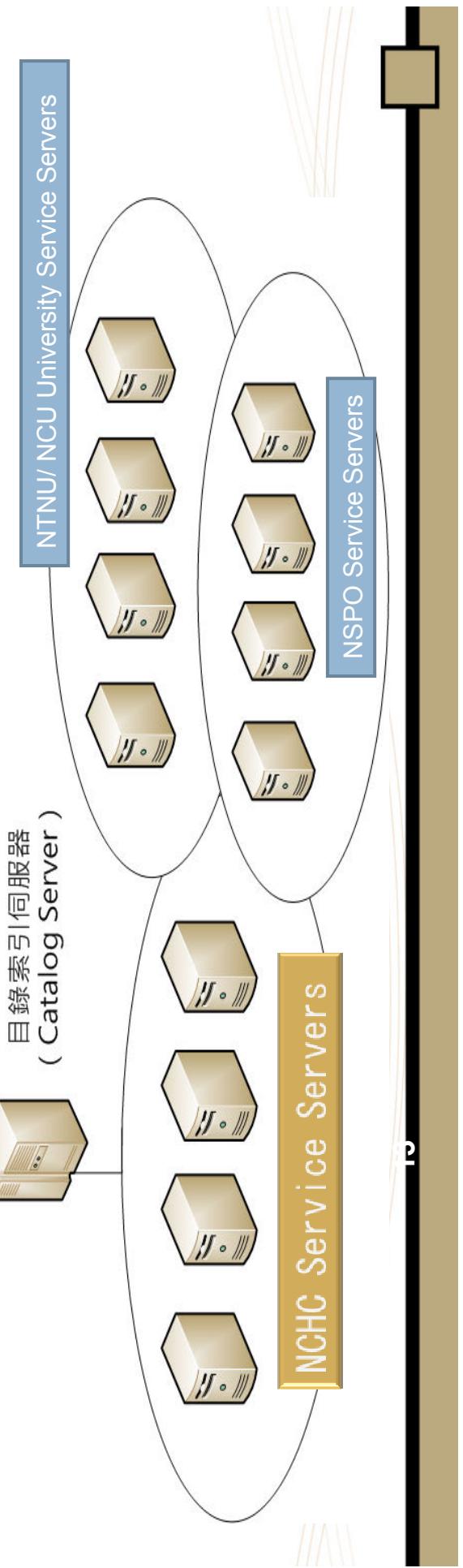
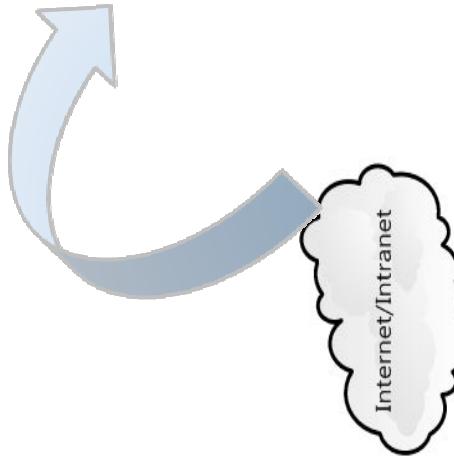
OGC 供應服務 線上地圖 圖資檔案 版本 URL

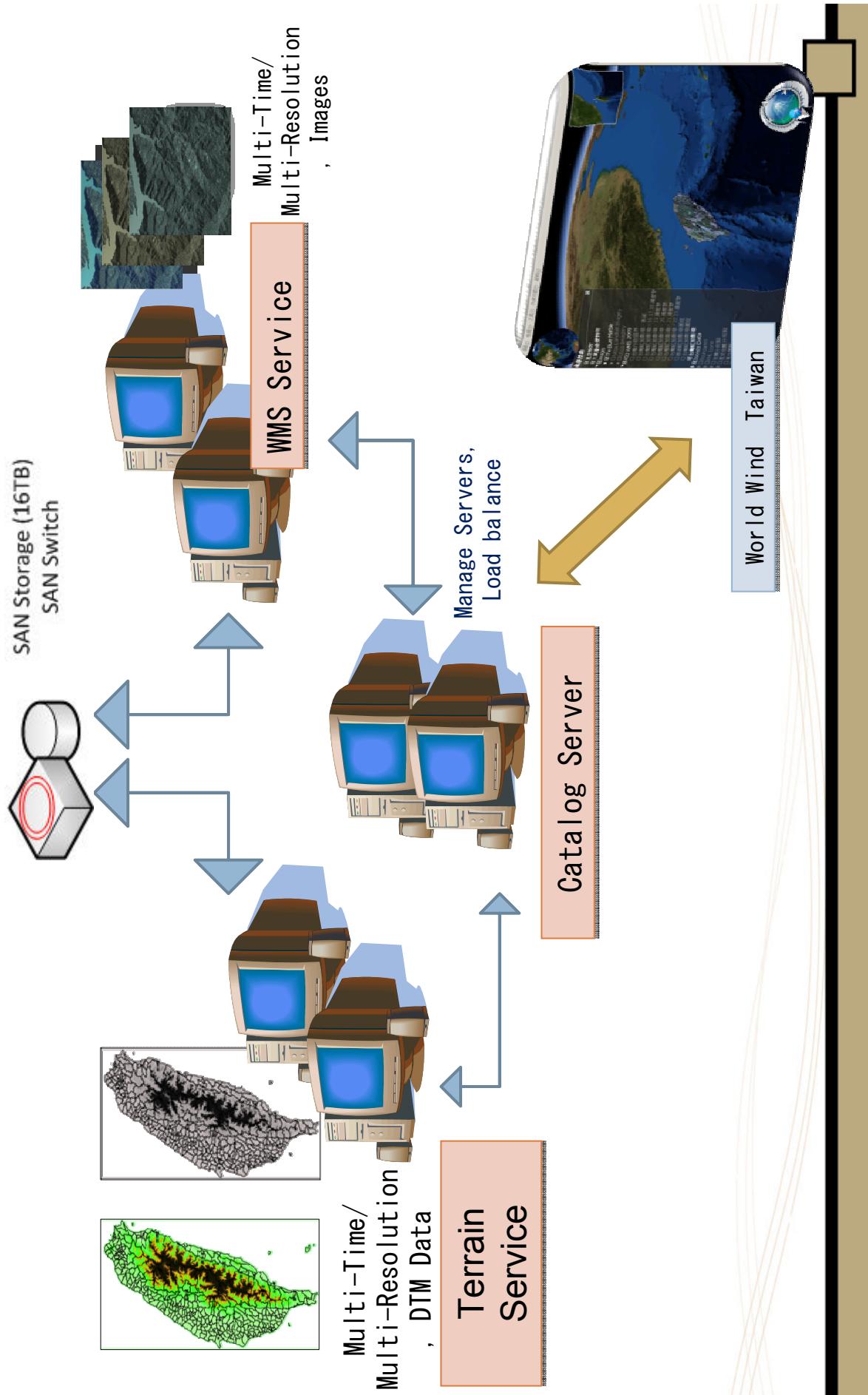
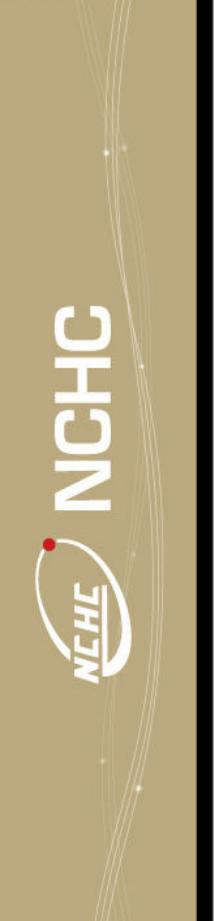
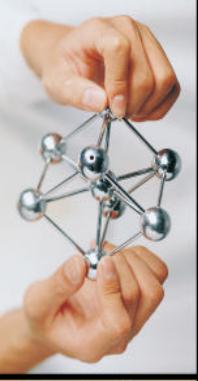
服務名稱	種類	版本	URL
Web Mapping Services			
全台總成正射影像(製圖網格)	WMS	1.1.1	http://172.16.143.41/asofb/wms?
最新版次 - 全台正射影像(單張)	WMS	1.1.1	http://172.16.143.45/asofb/wms?
所有版次 - 全台正射影像(單張)	WMS	1.1.1	http://172.16.143.46/asofb/wms?
向量圖資 & ADS Overview	WMS	1.1.1	http://172.16.143.46/asofb/wms?

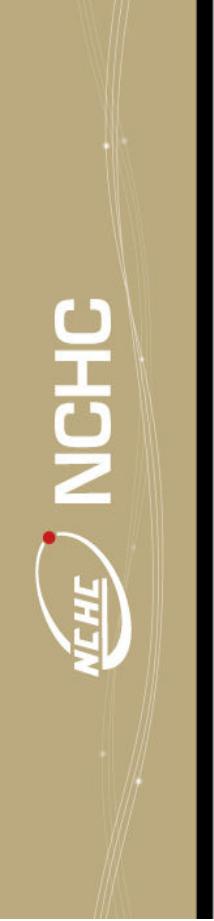
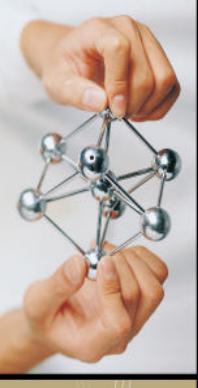
http://catalog_server/wms?

快選專技 聲組

屬性分析工具

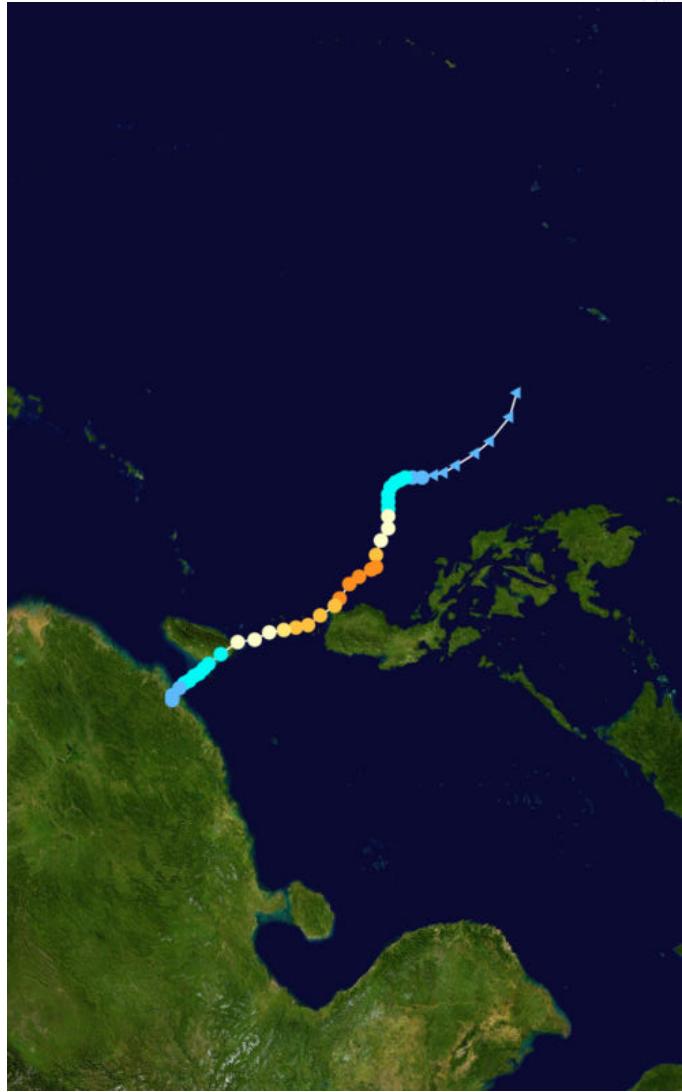


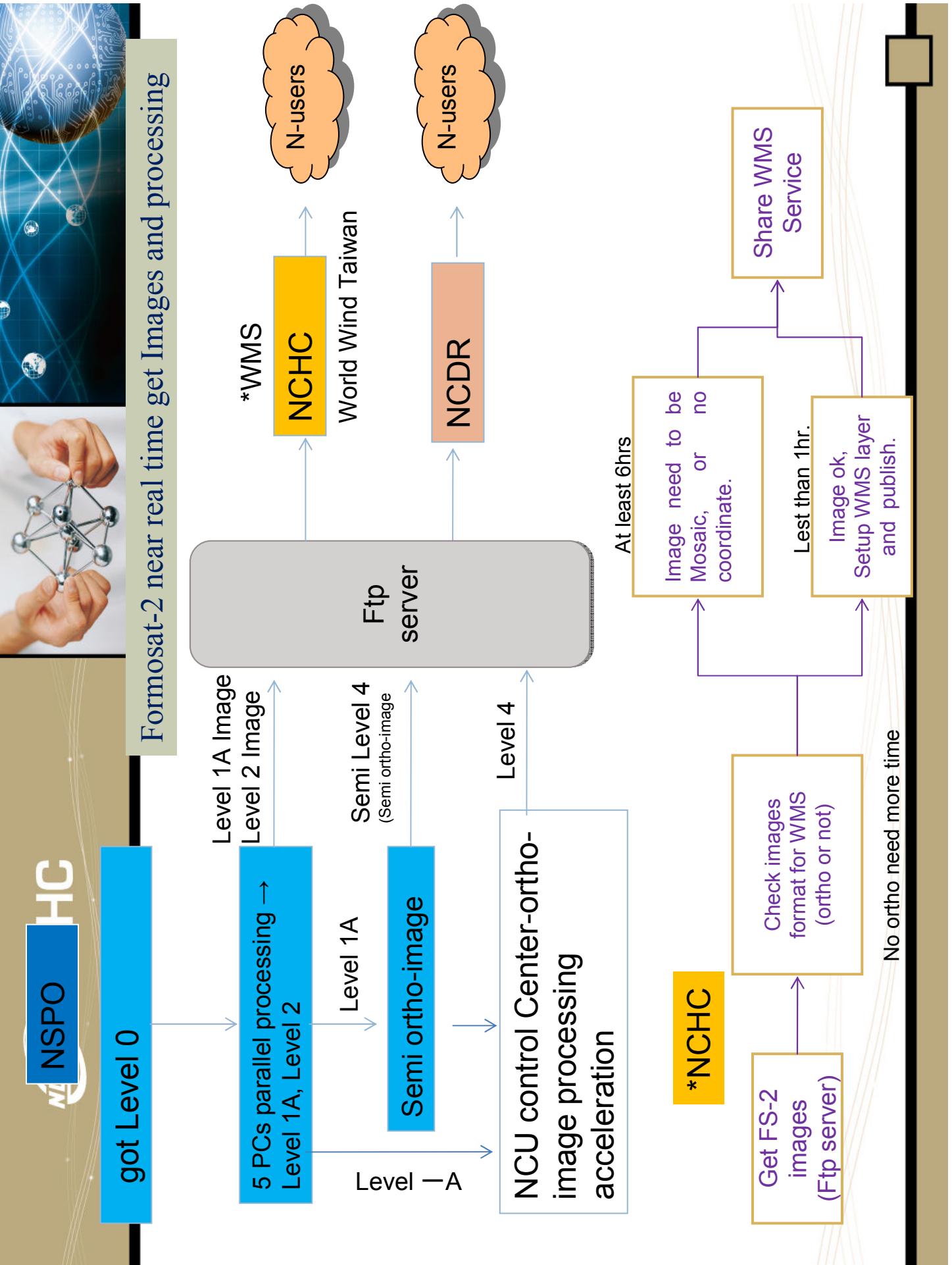




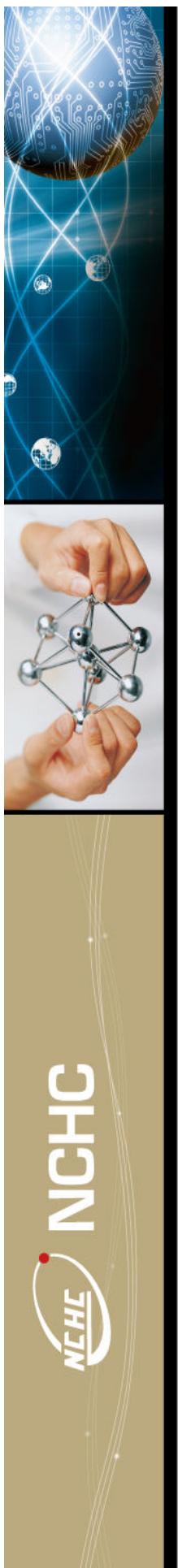
Use Case: Typhoon Nannadol (2011/8/30)

- After Typhoon Nannadol in August 31, 2011
- Disaster drill : 9:00-14:00 (NCHC, NSPO, NCDR)





Co-work Flow



0831南場部動圓近即時影像處理--09:30開始

線上使用者

- 周冠宇_NCHC(qy)
- 游燁宏_nchc/muler...
- 施奕良_NCDR(diang)
- 李正國_國家高速網...
colife/colife)
- colife2(colife2)
- 常若愚(stoca)
- 顏仲運_nsopo(keteyan)

檔案 電子白板 視訊會議 桌面分享 視窗(W)

CoLife

Video conference

Whiteboard

分工流程

Team member list

Chat room

Video conference interface showing multiple video feeds from participants.

Whiteboard interface showing a flowchart of the work process.

分工流程 (Work Process Flowchart):

```
graph TD
    A[分工流程] --> B[1.接收衛星影像  
2.影像處理  
3.影像傳輸]
    B --> C[分散平行處理影像]
    C --> D[1st上傳至FTP]
    D --> E[擷取影像  
做為備份]
    E --> F[擷取影像  
自行處理Level 1A]
    F --> G[擷取影像  
自行處理Level 2流程]
    G --> H[擷取影像  
參考]
    H --> I[WMS影...資料檢視]
    I --> J[常若愚(stoca)]
    J --> K[游燁宏_nchc/muler...]
    K --> L[李正國_國家高速網...]
    L --> M[顏仲運_nsopo(keteyan)]
```

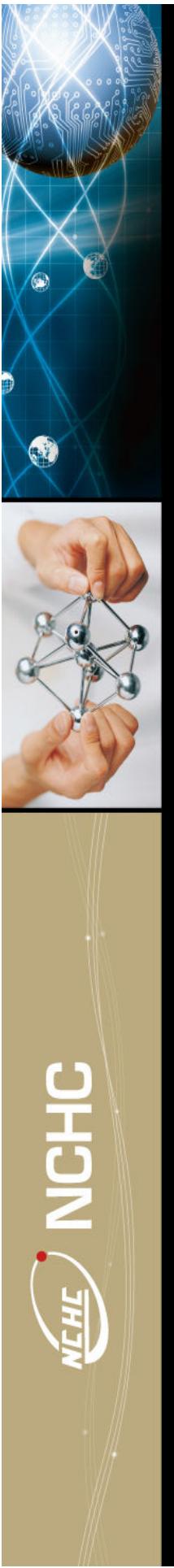
Team member list:

- 主席可以開始了
- 李正國_國家高速網路與計算機中心:(09:42:13)
不發言請關閉自己的麥克風
- 李正國_國家高速網路與計算機中心:(09:47:31)
本次演練有錄影
- 周冠宇_NCHC:(09:47:40)
10 在10:0進行處理
- 施奕良_NCDR(diang)

Chat room:

- CH 頭
- ↑ ↓ ← →
- 上午 09:55 2011/8/31

L0 image quick view



0831衛星遙感觀測技術的影像處理--09:30開始

檔案 電子白板 檔案會議 桌面分享 視窗(W)

線上使用者: 周庭彬_NCCHC(qq) 寶吉恩_keleyan 電子白板_桌面分享_keleyan_新串連_nsp0的桌面

ROCSAT 2 RSI 1(1) RSI 1(2)

Start of the reception (GMT) 31 Aug 2011 Day 31 Aug 2011 Day

Time 01:56:00 Time 02:02:07

Auxiliary data

Synchro. OK BER(a): 1.19e-05 BER(0): 0.000e+00 Trans.: DIRECT

Mission id: ROCSA... Instrument: RSI Mode: MS13.75

Filename: 125 FS count: 24233 Coding: CIPHERED

ROCSAT 2 RSI 2

Start of the reception (GMT) 31 Aug 2011 Day 31 Aug 2011 Day

Time 01:56:27 Time 01:56:27

Auxiliary data

Synchro. LOST BER(a): 1.44e-05 BER(0): 0.000e+00 Trans.: DIRECT

Mission id: ROCSA... Instrument: RSI Mode: MS13.75

Filename: 40 FS count: 5640 Coding: CIPHERED

視訊會議 我的画面

施立良_NODR(liliang) 李正國_國家高速網路與計算中心於10:15完成取福二衛傳影傳播

潘曉雲_wuhe(muler...) caifei(caifei2) 魏仲運_nsp0(Kerryan) 寶吉恩(stoca)

16.0 ips 14.5 ips 20.0 ips 10.0 ips

2011年8月31日

2011年8月

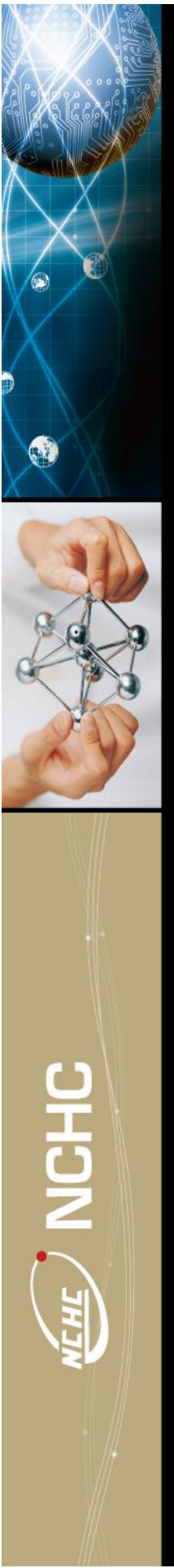
日 一 二 三 四 五 六 七 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 上午10:13:41

主要日期和時間設定值... 星期三

CH 2011/08/31 上午10:13

Windows Taskbar icons: Internet Explorer, File Explorer, Edge, Google Chrome, Microsoft Edge, FileZilla, WinRAR, Notepad, Task View, Task Manager, Control Panel, Start button.

L1A Image Processing Flow

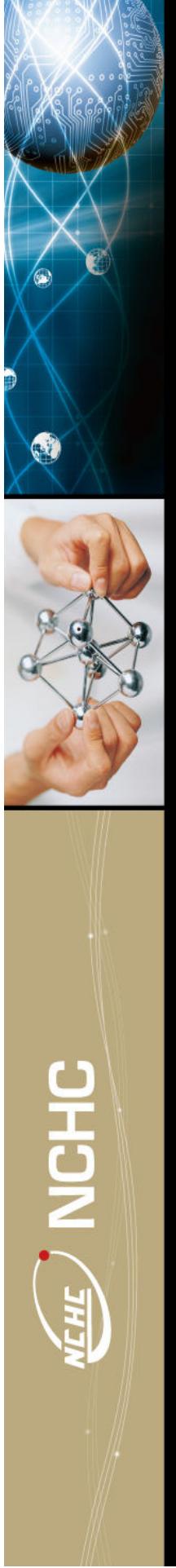


The right side of the slide displays a complex software interface for L1A image processing. The interface includes multiple windows:

- Top Left Window:** A video conference window showing three people in a lab setting, titled "視訊會議" (Video Conference) and "我的畫面" (My View).
- Top Right Window:** A clock showing the time as 11:01:43 AM on Monday, August 31, 2011.
- Middle Left Window:** A terminal window titled "rsync" showing a file transfer process between "root@kawau1" and "root@kawau2". It highlights the "7th Band" with a red callout.
- Middle Right Window:** Another terminal window titled "rsync" showing a similar file transfer process, highlighting the "6th Band" with a red callout.
- Bottom Left Window:** A terminal window titled "IDB : bash" showing a script execution process, highlighting the "1st Band" with a red callout.
- Bottom Right Window:** A terminal window titled "IDB : bash" showing a continuation of the script execution process.
- Bottom Center Window:** A "聊天室" (Chat Room) window with a message about a text file being processed.
- Bottom Far Right:** A system tray with icons for battery, signal, volume, and date/time.

A large red banner across the middle of the interface reads: "Using Co-located system for multiple communication for accelerating image processing".

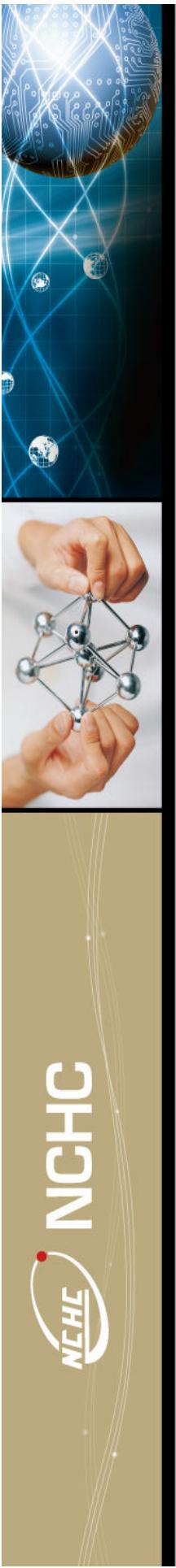
Transfer to FTP



This screenshot shows a computer desktop environment with multiple windows open, illustrating a process of transferring files to an FTP server.

- Top Right Corner:** Shows system status with a battery level of 12%, a signal strength icon, and the date/time 2013/8/31.
- Background Wallpapers:** Includes the NCCHC logo and a globe with network connections.
- File Explorer (Top Left):** Shows a folder structure. The path "F:\1\Taikwan\0530\Taikwan2\ORTH-01\" is highlighted. Inside, there are subfolders like ORTHO, TLE, Taiwan3, Taiwan4, and OrthoCase.
- FileZilla (Main Window):**
 - Left pane: Shows local files/folders in the current working directory.
 - Right pane: Shows the remote server structure, including "/public/OrthoCase" and "report".
 - Status bar: Displays file transfer details: "10 檔案, 總共大小: 2,425,075,738 Bytes", "方向 | 遠端檔案", "速率: 8.5 Mbps", and a progress bar indicating transfer completion.
 - Bottom status bar: Shows IP address "192.168.10.1", port "21", and timestamp "2011/08/20 12:39:59".
- Windows Taskbar (Bottom):**
 - Icons for File Explorer, Control Panel, Task View, File History, Adobe Photoshop, Microsoft Word, and others.
 - System tray icons: Volume, Network, Battery, and a search icon.
 - Start button on the far right.
- Other Open Windows:**
 - Google Earth showing a location in Japan.
 - Logitech QuickSync software window.
 - Windows Task Manager showing system performance metrics.
 - Minimized windows for NCCHC LIA影像, NCCHC LIA影像 (Details), Take a break 請大家12：20再回來, 施奕良_NCDR:(12:01:12), NCOR目前正在抓取臺灣中... (Details), 富岩標_NCHC:(12:14:50), NCCHC LIA影像於12:06抓取端份完成 (Details), 周冠翔_NCHC:(12:29:26), L2第1~3~7條已完成 (Details), 周冠翔_NCHC:(12:29:41), 創建遠程_1spop(12:23:26) (Details), 檢正遠端PAN已完成, 上傳中 (Details), 顏中憲_NCHC:(12:23:44) (Details), and 延長審核ANS處理中 (Details).

Get data and ready for WMS



0831臺灣都電重耕田時影像整理 -09:30開始

檔案 電子白板 視訊會議 桌面分享 檢視 (WV)

線上使用者: 周麗娟_NCHC(wlwan) cole.colife() 0.27.177.322 - 殘端桌面 Life 劍電子白板

註冊Mapper v10.00 - REGISTERED

File Edit View Tools Search GPS Help

ZNSP0test_0831 檔案夾 編輯(E) 檢視(V) 我的最愛(A) 工具(T) 說明(I) 上一頁 搜尋 檢索 資料夾 網址(0) ZNSP0test_0831 資料夾

資料夾

桌面 我的文件 我的電腦 SYSTEM (C:) DVD 光碟機 (D:) DATA (E:) dev_tools OIMS10.log OIMS11.log QPCubeTool_iv ShowTech HDBOX3 (F:) 新增磁碟區 (G:) ORAPI99_be02 於 NAS Server (40.110.27.199)' (X) 34_gis.exe 於 NAS Server (40.110.27.198)' (Z) trash-root 178.bk NASA NSP0test_0831 OIMS10_Data_NCHC OIMS10_Data_NCHC OIMS11_Data_NCHC OIMS_ms_k 可用空間 制圖台 網路位置 管道監視 NCHC_WMS_Report_5min

腳夫室 進行資料進入WMS Storage 寶石黑 (12.46:29) 5.4GB

創建過..._mapc(12:47:05) 12.第1 & 7無產品完成上傳 創建過..._mapc(12:48:33) 12.製造無產品完成上傳 創建過..._mapc(12:48:42) 亂序六 12.52:55) 目前正在WMS7 LAB的產品 能架具..._NCDR:(12:59:58)

LLA Fine軟件 施委員..._NCDR:(13:00:39) 目前正在下載... 亂序六 施委員..._NCDR:(13:07:12) 檢正輕量級檢視中

視訊會議 我的畫面 施委員..._NCDR(wlwan)

160x20 14.0 fps 李正國_ nsp0(teleyan) 19.5 fs 游宏宇_nchcmulderu) 14.0 fs 寶石黑(stoca) 15.5 fs 14.0 fs

For Help, press F1

W:\ 0 0 Help... 開始 | C:\Windows\Start... Global Mapper v10... C:\Windows\System32... FWTicks Shell

CH 電話 2 電子白板 檢視 (WV) 訊息 下午 01:07 2013/8/31



WMS Operation : Web Admin

The screenshot shows a Windows desktop environment with several windows open:

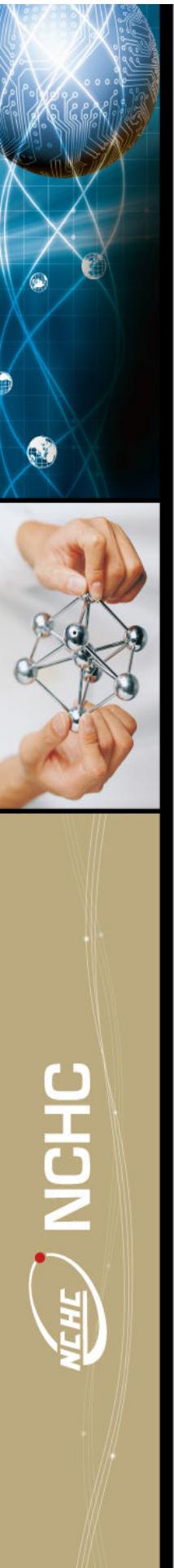
- Top Window (Video Conference):** A video conference interface with four participants. Participants include "我的畫面" (My Screen), "施奕良_NCDR(liliang)", "李正國_keleyan", and "翁若愚_stoic".
- Second Window (O.I.M.S. v10.01):** An application window titled "Add Raster Data Source". It contains sections for "About & Status", "Basic Store Info", "Data", "Services", "Settings", "Security", and "References".
- Third Window (GeoLife):** A desktop application window titled "1. Add Raster Data Source - Windows Internet Explorer". It shows a toolbar with icons like "File", "Edit", "View", "Insert", "Format", "Tools", "Help", and "Search". The main area displays a list of users and their status: 周延生_NCHC(wy), 頭仲惠_stoic(coffey), 朱志強_keleyan, 施奕良_dong, 翁若愚_stoic, and 李正國_keleyan.
- Bottom Window (WMS Storage):** A window titled "進行資料進入 WMS Storage". It lists various storage entries with their sizes and last modified times:
 - 進行資料進入 WMS Storage (12:47:55) 5.3GB
 - 翁若愚_stoic (12:47:05)
 - L2 第1 & 滾筒產品完成上傳 (12:48:33)
 - L2 第3捲產品完成上傳 (12:48:12)
 - 翁若愚_stoic (12:48:12)

NCHC



Publishing image for multiple WMS users

The screenshot shows a Windows desktop environment. At the top, there is a taskbar with various icons. The main window is a video conferencing application titled "視訊會議" (Video Conference) with the sub-tab "我的畫面" (My Picture). It displays four video feeds from different participants. Below this, another window titled "視訊會議" (Video Conference) is open, showing a 3D map of a coastal area with mountains and a city. The desktop background features a grid pattern with small globe icons. On the left side, there is a vertical bar labeled "線上使用者" (Online Users) which lists several user names and their corresponding icons.



Concluding Remarks

- World Wind Taiwan Platform, a **customized system** for decision support to disaster assessment and scenario identification.
- **NCHC WMS Cloud**, easy to access, quick response.
- **Virtual Machine Architecture**, extend WMS/WFS by smart way and scale-up quickly.
- In our case, the Infrastructure support the operation very well, if we can speedup the **image processing** as soon as possible.

Thank you for Your Attention

