CADASTRAL STUDIES
(MGU1014 / MGHU1514)

WEEK 10-eCADAstre SYSTEM AND
MULTIPURPOSE CADAstre

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07-5530844
016-4975551
OUTLINE

• eCadastre System

• Multipurpose Cadastre
eCADASTRE SYSTEM
Computerisation

- Started as early as in 1985
- Computer Assisted Land Survey System (CALS)
  - CALS Johor in 1985
  - CALS Pahang in 1990
  - Mini CALS for other States in 1995

Objectives:
- Establish Digital Cadastral Database (DCDB)
- Provide digital cadastral data to Land Offices
- Facilitate faster production and updating of cadastral maps.
Three (3) main Components

- Cadastral Data Management System (SPDK 1997);
- District Survey Offices Automation System (SAPD 2000)
- Total Station Survey System (STS 2002).
FIELD-TO-FINISH
(State JUPEM Office)

1. Requisition of Survey (RS) from land Office

2. e-SR

RS registration and digital filing

3. e-SKL

Online data transfer of Field Computation data to District Offices

Field Computation data for Field Work preparation
Online data transfer of Field Computation data from State JUPEM

District Surveyor distribute survey job to Field Officers

Determination of survey locality with TeleGPS

Validated data uploaded online into State JUPEM

District Surveyor validate data from field

Field Survey

Field Officer processed and upload data into SAPD

SAPD

STS

Pocket PC

Field Communicator

Field Officer processed and upload data into SAPD
FIELD-TO-FINISH
(State JUPEM Office)

Online data transfer between SAPD and SPDK

Generate Calculation Volume and Certified Plan

Digital Title Plan send to Land Offices

Digital Certified Plan

DCDB

Digital Certified Plan

SPID

Director of Survey and Mapping approved Certified Plan with Digital Certification

Updating DCDB and SPID Image Library
MALAYSIA 9th DEVELOPMENT PLAN
eCADAstre PROJECT
Objective

- Expedite the delivery system;
- Creation of the National Digital Cadastral Database (NDCDB);
- Creation of the Strata Database;
- Provide infrastructure and GIS-ready information; and
- Embark on satellite technology (GNSS)
Delivery System

Expedite the delivery system, the strategy taken consists of the following:

♦ Change the existing survey procedure;
♦ Embark on the latest ICT approach in the cadastral survey;
♦ Strengthen the existing survey regulation and ruling;
♦ Integration with land related systems - Land Office’s eTANAH, Licensed Land Surveyor Board’s eLJT and Ministry of Natural Resources and Environment’s MyGDI.
To create the National Digital Cadastral Database (NDCDB), the strategy taken consists of the following:

- Based on the successful implementation of the Melaka’s NDCDB;
- A homogeneous and seamless database with survey accurate coordinate;
- Based on the national geocentric datum (GDM2000);
- Creation of Cadastral Control Infrastructure (CCI);
- Support the implementation of utility mapping.
Strata Database

To create 3D Strata Database, the strategy taken consists of the following:

♦ Outsource the data capturing for 499,618 strata parcels;

♦ Embark on fully digital concept;

♦ Provide 3D information.
GIS

To provide infrastructure and GIS-ready information, the strategy taken consists of the following:

- NDCDB will fully GIS-ready;
- Create additional layer in the GIS Layer Management System (eGLMS);
- Support the creation of multipurpose cadastre.
To embark on satellite technology (GPS) in cadastral survey, the strategy taken consists of the following:

- Use of GNSS in field survey;
- Utilization of MyRTKnet;
- Deployment of real-time data processing.
PROJECT eCADASTRE WORKFLOW
Application Modules

Web GIS
- eLodgement
- eKadasOnLine
- eSIM
- eBorang
- Ecadasonline
- eKiosk
- eRecording
- eMonitoring

Desktop GIS
- ePU
- eGLMS
- eJalan
- eTownKg
- eAdminBdy
- eHidrografi
- eBangunan
- eWarta
- eGrid

Database
- NDCDB
- PDUSSM
- GLMS

Field GIS
- eFEE
- eMap
- eCRM
- eTS
- eSSM
- eETM
- Total Stn Survey
- GNSS Control
- Bldg Verification

Non GIS
- eMedmAS
  - Calibration
- eSupport
  - Maintenance
- eReporting
  - eReporting
- SPPK
  - SPPK

SPEK
- eSPEK
  - DB Merging
  - eQC
  - Lot overlap

Strata GIS
- Strata 3D viewer
- Strata Data Entry LS

Strata
- ePU
- eEFE
PHASE 1

1. Licensed Land Surveyors (LS)
   - Strata XML
   - 16 Fieldbook ASCII
   - Building Raster Plan
   - Lst File

2. Land Offices

3. eSSM UNIT
   - Register Strata File, Data Lodgement, Verifier, Updating Temp and Extraction Module

4. Download
   - Strata Survey Module + “Laser Ranging”
   - Survey Costing Module

5. Upload
   - Advised to Land Offices and cc to LS, LJT, JUPEM HQ and Land Owner

6. CS/OD Digisign
   - In Order / Not In Order

7. Verification Data
   - 2 LAYER
     - Provisional Block
     - Strata Block

8. Update Status

STANDARD PDUSSM UNIT

INSPEKTORAT UNIT
eCADASTRE: WORKFLOW

STRATA SURVEY

**PHASE 2**

1. PTG Final approval
2. JUPEM2U Internet
3. JUPEM2U Update CSRS & Generate Scheme Number
4. Generate
5. 3D Strata Viewer

**STATE JUPEM**

6. JUPEM2U
7. LS Login jupem2u & Endorsed PA(B)
8. Acknowledgement to LS by sms
9. B4/PA(B)
10. PA(B)
11. CS update
12. B4 Title Plan Preparation Module
13. B4 Title Plan

**eSSM UNIT**

- TEMP PDUSSM
- Generate B4 Title Plan
- Generate PA(B)
- Generate

**STANDARD PDUSSM UNIT**

- B4/PA(B) PA(B)
- CS
- JUPEM2U
- KOMMS
- KOMMS
- PDUSSM
- PDUSSM
- SPID
- SPID
eCADASTRE APPLICATION
MODULES
Application Modules

1. NDCDB
2. JUPEM2U
3. CSRS
4. ePU
5. eSIM
6. eNotification
7. eMonitoring
8. eReporting
9. eCRM
10. eTSM
11. SUM
12. eSPEK
13. eQC
14. DRP
15. eFee
16. eGLMS
17. eCadasOnline
18. eSRMS
19. PKI
20. eSupport
21. eKomms
22. PDUSSM
23. eSSM
NATIONAL DIGITAL CADASTRAL DATABASE (NDCDB)
Background of NDCDB

♦ Digital Cadastral Database (DCDB) contains all information obtained from cadastral survey jobs related to boundaries of land parcels.

♦ The existing DCDB, which covers the entire country, was developed from historical survey data (conversion from hardcopy Certified Plans to digital) as well as from current survey jobs.

♦ Coordinates in the DCDB were obtained from several means and contain varying, unpredictable, and un-quantified errors.
Uncertainties of surveyed values are typical, but errors are more common in some rural areas.

To be able to support a modern cadastral system, an accurate positional record of the cadastre is imperative. The existing DCDB was not designed for this purpose.
Background of NDCDB

DIFFERENT TYPES OF CADASTRAL COORDINATES

RIGID COORDINATE

Homogenous and Systematically Adjusted

For cadastral map plotting purposes

SYSTEM COORDINATE

System/Software generated coordinate based on features location

Rigid Coordinate

Plotting Coordinate

System Coordinate
Background of NDCDB
Background of NDCDB

OLD AND NEW GEODE蒂C INFRASTRUCTURE:

GEODE蒂C TRIANGULATION
PENINSULAR MALAYSIA

GPS BASED REFERENCE SYSTEM
Bowditch adjustment distributes closing errors linearly but not able to provide a unique coordinates solution.

Least Squares adjustment technique determine a unique set of coordinates for each boundary mark from a set of observed values (bearings & distances).
**NDCDB**

**THE METHODOLOGY:**

1. **Establishing State Cadastral Control Infrastructure (CCI)**
2. **Tie-Up of Selected Parcel Corners to CCI**
3. **Development of State Cadastral Control Database (CCDB)**
4. **Populating DCDB with Survey Accurate Coordinates**
5. **Automated Re-Coordination System**
6. **Finalized Geocentric Based Cassini & RSO Coordinates in DCDB**

- Establishment of CCI and State CCDB
- Repopulation & Re-coordination of DCDB with Survey Accurate Coordinates
- Study on Cadastral Survey Procedures Under CCS
- Cost-Benefit Analysis of CCS Implementation
NDCDB

THE ADJUSTMENT:

FORMATION OF CADAstral NETWORK

Data Selection

Adjustment

Transformation

Quality Control

Temp NDCDB

Editing

SURVEY ACCURATE DIGITAL CADAstrAL DATABASE (NDCDB)

RE-COORDINATION USING AN AUTOMATED DATA CONVERSION SYSTEM (ADCS)

Data Integrity Check

Connection Line File

CCDB

DCDB

NDCDB
NDCDB

CADASTRAL CONTROL INFRASTRUCTURE (CCI) EMPLOYING WHOLE TO THE PART CONCEPT AND GPS TECHNOLOGY
NDCDB

State of Johor
CCI Point
Methodology For Cadastral Data Migration To The New Geocentric Datum For Malaysia (GDM2000)

Expected NDCDB Spatial Accuracy

<table>
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<tr>
<th>CATEGORY</th>
<th>Std Dev Northing</th>
<th>Std Dev Easting</th>
<th>Cadastral Control Spacing</th>
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<tr>
<td>Urban/New Development</td>
<td>± 5 cm or better</td>
<td>± 5 cm or better</td>
<td>0.5 km</td>
</tr>
<tr>
<td>Semi Urban/Rural</td>
<td>± 10 cm or better</td>
<td>± 10 cm or better</td>
<td>2.5 km</td>
</tr>
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</table>

Total estimated number of boundary marks to be re-coordinated is about 40 million boundary marks.
Background of NDCDB

- Multipurpose cadastre underpin a good Land Information System (LIS)

Consequences: Hinder Integration of Spatial Data At National Level
NDCDB

- LS 600 Parties
- JUPEM 300 Parties
- District Surveyors
- JUPEM2U
- SUM
- eQC
- eSPEK
- CSRS
- NDCDB
JUPEM2U
(Cadastral Working Portal)
JUPEM2U

♦ JUPEM2U is the remote one-stop interface via the internet for designated users to conduct their business with States’ JUPEM without being physically present at states’ JUPEM offices;

♦ JUPEM2U application is to developed using Web technologies incorporating MapInfo GIS engines and MapXtreme.
## JUPEM2U

<table>
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<th>Databases, Files Servers</th>
<th>CSRS</th>
<th>Gateway</th>
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<tr>
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<td>• Application Systems</td>
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<td>• Data Communications</td>
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<td>• System Integrations</td>
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<td>• Networking</td>
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- **Web server/KOMM server/SUM**
- **FIREWALL**
  - JUPEM2U SERVER

### Users
- **District Surveyors**
- **Field Officers**
- **Licensed Land Surveyors (LLS)**
- **LLS Field Officers**

### Links
- [www.JUPEM2U.gov.my](http://www.JUPEM2U.gov.my)
CSRS, eFEE, eCadastOnline
(Cadastral Survey Record System, Survey Fee Module)
CSRS, eFEE, eCadasOnline

♦ CSRS is a survey file management system;

♦ eFEE to calculate the actual survey fee after the Certified Plan is drawn and the job is completed;

♦ eCadasOnline provide search and view of all survey information within the databases;

♦ Application developed using Web technologies incorporating MapInfo GIS engines and MapXtreme.
### CSRS

**Home**

- **Login at 29 Oct 2012, 02:47 PM**
- **Nama:** KAMAROL AZMIL BIN ADZHAN
- **Role:** MGT(14)-PPU_HMT

#### Kerja Dalam Tindakan

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**Ver. 3.12.1025.173358**
### SURVEY FEE REPORT:

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<th>Hakmilik (RM)</th>
<th>Jumlah (RM)</th>
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ePU
(Request of Survey (RS) File Registration and Field Tracing (eSKL) issuing)
ePU

♦ ePU for survey file registration and produce of field tracing;

♦ Application developed incorporating with MapInfo GIS engines.
ePU

ePU Section

1. PU Registration CSRS
2. Creating File
3. Key-in PU Info
4. generate lot number
5. Store physical File

Scan, Digitise, Update PU layer (PU ASCII)

Generate SKL layer- SKL ASCII
Pre_survey_layer

Land Offices
PU Hardcopy
PU Softcopy (PU ASCII)
* .pub (boundary)
* .pud (detail)
* .pul (lot)

JUPEM2U

Field Surveyors

CRM Section
CRM Layer

SKL ASCII
* .skl (Lot)
* .skb (Boundary)
* .job (Details)
### ePU-File Structure

**Presurvey ASCII (SKL – ASCII)**

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One .skd may contain several PUs. Every PU in .skd must have Negeri, Daerah, Mukim, Seksyen, PUNo, FileNo and SKLNo.
LEMBAGA JURUKUR TANAH MALAYSIA
(LAND SURVEYORS BOARD)

ARAS 5 - 7 WISMA LJT
LORONG PERAK
PUNJAT RANBANG MELAWATI
50100 KUALA LUMPUR
No. Telepon: 03-41880391
No. Faksimili: 03-41880376
e-maill: secretariat@ljt.org.my
laman web: www.ljt.org.my

SIJIL AKUAN
No: C287410

KANUN TANAH NEGARA, AKTA 56/1965 (PINDAN 1985) SEKSYEN 409A

Dengan ini dikelaskan bahwa bengis asas ukur seluas asas RM 10,820.00

Ringgit Malaysia Enam Belas Ribu Lapan Ratus Dua Puluh Lapan Senaja

untuk

LOT, bengis asas ukur sesuai taburan

No Lot
LOF 28124 (PT 5071)
LOF 28125 (PT 5672)

Bagian / Pejabat Muka
SETAPAK (MUKIM)

Seksi
NA

Datera

Negeri
W.P. KUALA LUMPUR

Rujukan Pejabat Tanah
PJSTP/32982011

telah diterima oleh Lembaga Jurukur Tanah daripada

BESTARI HOLDINGS SDN. BHD.
LOT 528 & 529
JALAN PERUSAHAAN 3
BANDAR BARU SUNGAI BULICHI

47000 SELANGOR

2. Kerja ukur ini akan dilaksanakan oleh
TECH TEIK LEONG
PERUNDING: UKUB TEKNIK
20-2 JALAN DJU 516
DATARAN SUNWAY
KOTA DAMANERIA
PETALING JAYA

47810 SELANGOR

018359
PUD 52982

Lembaga Jurukur Tanah Malaysia
## ePU-SKL ASCII Sample

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eCRM
(Cadastral Reference Mark)
eCRM

♦ eCRM is a module with the aim of creating CRM points within the eGLMS layer database;

♦ Four (4) phases of processes in eCRM namely: Extraction, Establishment, Validation and Update;

♦ Application developed incorporating with MapInfo GIS engines.
eCRM

- Planning
- Establish CRM
- Observation
- Processing
- Transform Module
eCRM
eCRM-File Structure

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eTSM
(Title Survey Module – Field Data Capturing)
eTSM

♦ eTSM is a module for field data capturing that comply with JUPEM Survey Regulation and practices;

♦ Application developed incorporating with MapInfo GIS engines.
eTSM
eTSM
## eTSM-File Structure

### JUPEM FIELDBOOK ASCII

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*Note: The values in Tables 1 and 2 are hypothetical and not based on any real data.*
Surveyed ASCII Folder Structure (Signed)
eSUM, eQC, eSPEK
(Virtual Survey Module, Validation and Updating Module)
eSUM

♦ eSUM is a web-based application catered for the need to verify and validate the survey ASCII files submitted by JUPEM District Officer and Surveyors as well as from Licensed Land Surveyors, using Least Square Adjustment software;

♦ eQC is a module to validate surveyed data;

♦ eSPEK using GIS engine to perform graphical computations, spatial analysis and NDCDB Updating;

♦ Application developed incorporating with MapInfo GIS engines.
Sistem Ukur Maya (SUM) is a web-based application allowing field officers to perform validation of survey data while in the field.

The online adjustment is carried out using Least Square Software.
Adjustment Statistical Summary

Convergence Iterations = 3
Number of Stations = 841
Number of Observations = 11298
Number of Unknowns = 1676
Number of Redundant Obs = 9622

Observation Count Sum Squares Error
of StdRes Factor
Distances 5649 163.245 0.184
Az/Bearings 5649 10261.439 1.460

Total 11298 10424.684 1.041

Warning: The Chi-Square Test at 5.00% Level Exceeded Upper Bound
Lower/Upper Bounds (0.986/1.014)
eQC
eSPEK
DRP
(Digital Raster Plan Module)
DRP

- DRP is to cater to the need to handle the viewing, rasterization and production of eKadaster output products.

- These end products include Certified Plans (Title Survey & Strata/Stratum/Marin Survey), Gazette Plans, Title Plans (B1 & B4) as well as Standard Sheet.

- Application developed incorporating with MapInfo GIS engines.
A3 Landscape
DRP
Adalah dikuatkuatkan Sokoyen 3 dalam Akta Pelan dan Dokumen Tanah
dan Lombong (Salinan Fotografi 1950 (Semakan 1980), bahawa, ini adalah
salinan pelan yang betul bagi benar yang telah dibuat pada 28.12.2010
bagi lot 3097 di dalam Sandar Baru, Daerah Pontian, Negeri Johor
seperti ditunjukkan di atas pelan PA1111421.

Skala 1:500

PETA KADASTER 57 C II

CHW KEAT LIM
D.P. PEMBARUAN URUK DAN PEMETAAN
JUNIOR
TARikh : 22/02/2011
ePKI
(Public Key Infrastructure)
ePKI

- PKI authentication solutions comply to Malaysia’s Digital Signature Act (DSA) 1997 and the Digital Signature Regulation (DSR) 1998;

- Cater for digital authentication, digital signing and 2D bar coding with digital envelope;

- A complete PKI authentication solution from Malaysia’s Certification Authority (CA).
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ePKI
PDUSSM, eSSM
(Strata Survey Database and Strata Survey Module)
To establish a digital strata database called Pangkalan Data Ukur Strata/Stratum/Marin (PDUSSM) with 2D and 3D graphical information, as well as the necessary tools to capture and manage the strata title plans digitally;

Strata Survey Module (eSSM) to allow surveyors conduct verification survey for Strata parcels;

Application developed incorporating with MapInfo GIS engines.
PDUSSM, eSSM
PDUSSM, eSSM
PDUSSM, eSSM
eGLMS
(GIS Layer Management System)
To enhance the current GLMS layers and expanded to cater to the eCadastre implementation, particularly with the establishment of NDCDB;

An enhanced process of updating and maintenance of these layers are performed;

Application developed incorporating with MapInfo GIS engines.
eGLMS
eSupport
(Fault Log Management System)
eSupporty

♦ Enhance the present Fault Log Management System (FLMS) with additional functionalities;
♦ Establish a paperless management and monitoring system;
♦ Application developed incorporating with .NET engines.
eSupporty
eSupporty

Fault Log - Summary of Status (24 July 2012 ~ 23 February 2013)

Total Fault Log Status
- Active: 24%
- Solved: 60%
- Cancelled: 9%
- KIV: 4%
- New Requirement: 3%
THANK YOU