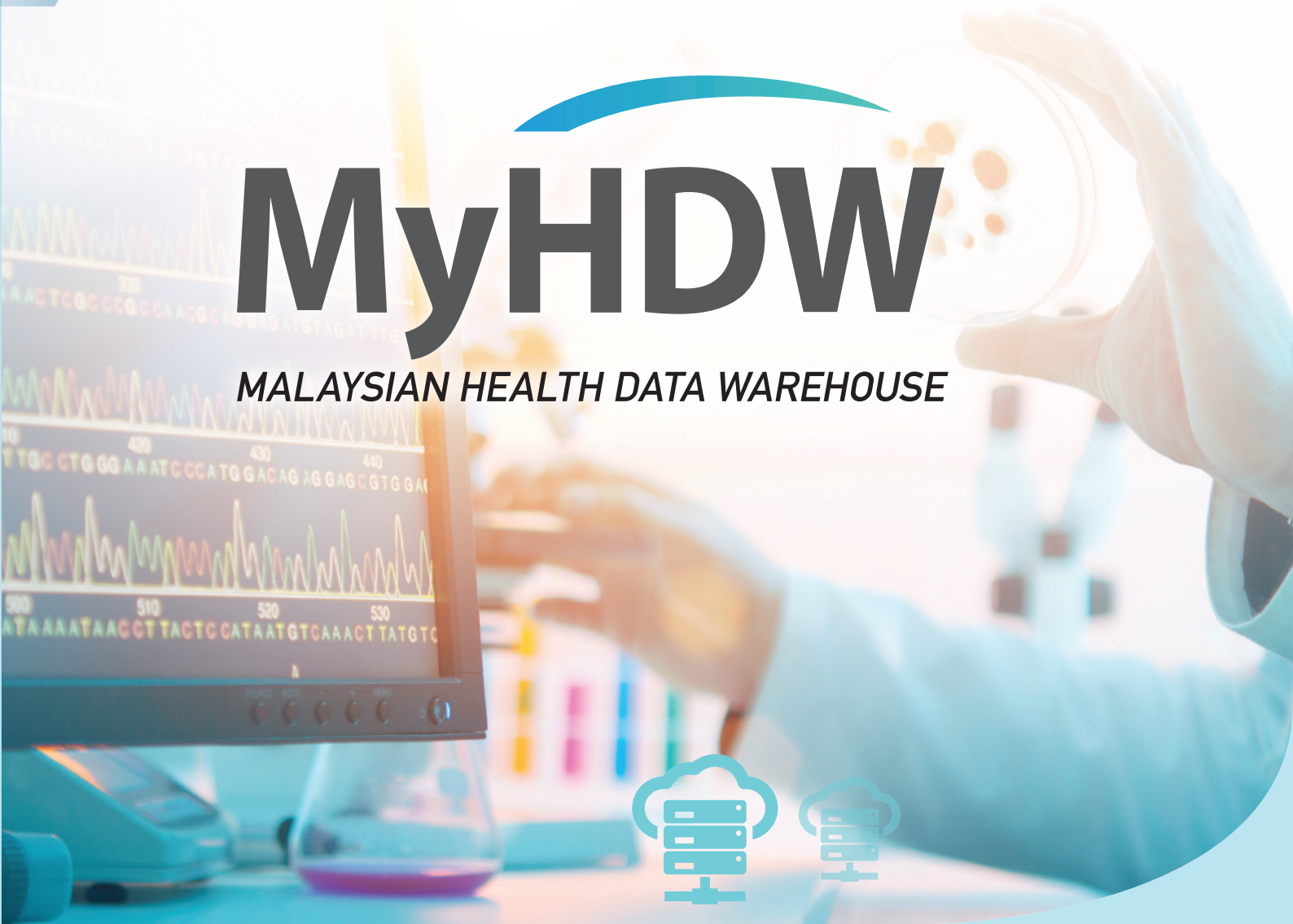# MyHDW

## MALAYSIAN HEALTH DATA WAREHOUSE

◆ **MyHDW** is a trusted source of comprehensive healthcare data structured for query and analysis purposes.

### AWARDS

OpenGov Asia Recognition of
Exellence Award (2018)

SHARE/GUIDE ICT
Award (2019)

Malaysia is 7th country in the world
to own such a system

**Trusted, comprehensive data for efficient query & analysis
towards better healthcare planning**

# MIMOS in Healthcare

MIMOS is Malaysia's national applied research and development centre focussing on generating technology solutions that enable the government to provide better services. In the field of healthcare and medical technologies, MIMOS develops need-based, consumer-centric solutions that have supported the consistent and quality delivery of medical and healthcare services.

Ongoing and successful projects include applications for the Ministry of Health (MoH); namely the Teleprimary Care and Oral Health Clinical Information System, the Malaysian Health Data Warehouse, Medical Treatment Information System, Patient Registry Information System, and Food Safety System of Malaysia.

Backed by strong capabilities in Artificial Intelligence, Data Analytics and Integration; along with other cutting-edge technologies such as photonics, smart sensors and Internet of Things, MIMOS is committed to driving continuous improvement in healthcare for Malaysia.

MyHDW unifies and pseudonymises health data and statistics from government hospitals and clinics, university hospitals, military hospitals, private hospitals and clinics, as well as other health-related agencies in Malaysia.

## Value

MyHDW offers actionable insights from Big Data Analytics, with patents filed by MIMOS alongside MoH as co-inventor. The usage of MIMOS technology amounts to a positive cost-benefit ratio; and reflects sustainability principles of balancing health, economic and homegrown capabilities that results in less reliance on foreign technology.
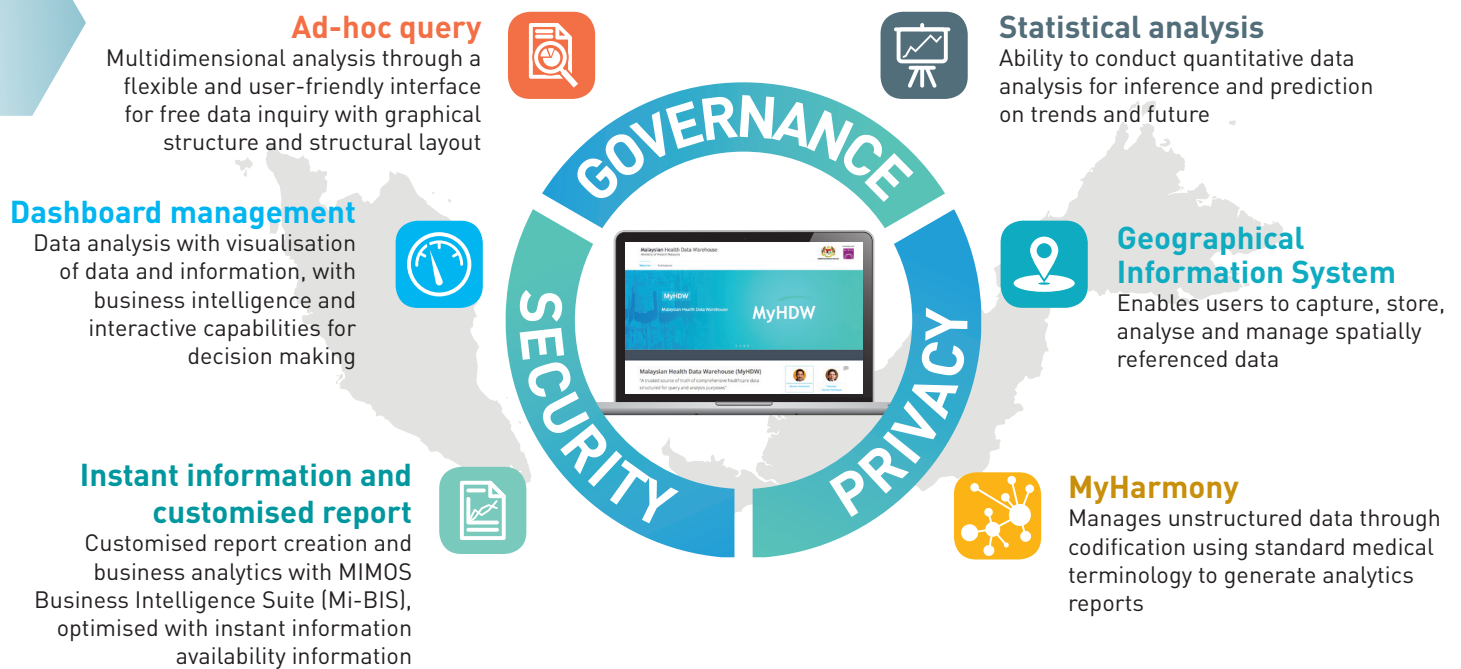
MyHDW is designed to provide holistic health information for policy making and formulation of government strategies and action plans. In addition, it can also help in monitoring as well as measuring performance and outcomes of a policy implementation.

The system also provides rich resources for statisticians, researchers and data scientists to conduct clinical or population research that can benefit the Malaysian healthcare sector.

Ultimately, MyHDW serves as an intelligent vehicle for data linkage and integration that offers broader benefits for community pertaining to health information and related contexts.

# MyHDW Features

### Ad-hoc query
Multidimensional analysis through a flexible and user-friendly interface for free data inquiry with graphical structure and structural layout

### Dashboard management
Data analysis with visualisation of data and information, with business intelligence and interactive capabilities for decision making

### Instant information and customised report
Customised report creation and business analytics with MIMOS Business Intelligence Suite (Mi-BIS), optimised with instant information availability information

### Statistical analysis
Ability to conduct quantitative data analysis for inference and prediction on trends and future

### Geographical Information System
Enables users to capture, store, analyse and manage spatially referenced data

### MyHarmony
Manages unstructured data through codification using standard medical terminology to generate analytics reports

**GOVERNANCE · PRIVACY · SECURITY**

**MyHDW**

## MyHDW Offers

**Security** – The MIMOS-developed Multi-factor User Authentication platform (Mi-UAP), enables user authentication profiles, based on guidelines provided by MAMPU

**Privacy and Confidentiality** – MyHDW subscribes to the Personal Data Protection Act (PDPA) 2010 under which all data will undergo a pseudonymisation process using Privacy Assurance Services (PAS) to anonymises patient information

**High Quality Validated Data** – MyHDW produces high quality system-generated data through proper testing and validating processes by experts, according to the business requirements.

**Sustainable, accredited and patented local technology** – 90 percent of MyHDW technology is homegrown and developed by MIMOS; 22 patents filed at the Malaysian patent office (MyIPO), with Ministry of Health as co-inventor in 2 patents.

## Future Plan

MyHDW primarily focuses on establishing the fundamental underpinnings for a national health analytic system, both technically and in terms of supporting program services.

Data architecture of the current phase focuses on an implementation of a traditional structured data warehouse, including semi or unstructured data that stored in RDBMS and Hadoop/HDFS data management system.

Similar to Data Lake, MyHDW data are stored in a native format normally in Hadoop that allows data to be utilised in downstream traditional data warehouses or directly into predictive or data discovery analytic tools.

Another area in which Big Data Analytics technology offers significant advantages is in the reduction of data latency with the delivery of right or near time data. This also has the added benefit of significantly reducing costs associated with ETL.

## ENGINE COMPONENTS

### Malaysian Health Data Warehouse
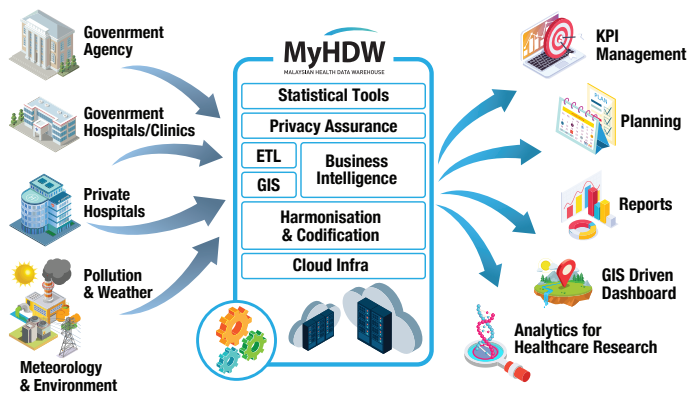


MyHDW comprises the following components:

- Extract Transform Loading (ETL - Kimball Dimensional Modelling)

- Business intelligence (Reporting, ad-hoc query, dashboard, statistical and predictive analytics [SPA])

- Portal System

- System integration for incoming and outgoing data flow

- Privacy Assurance Service to manage the privacy information

- Geographic Information System

- Harmonisation and codification (MyHarmony)

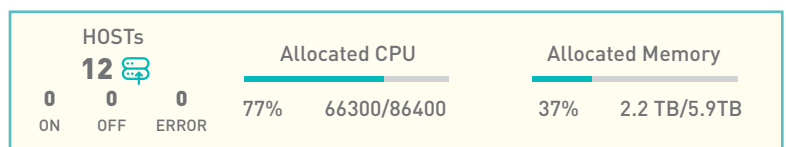- Unified Authentication Platform

## SYSTEM ARCHITECTURE
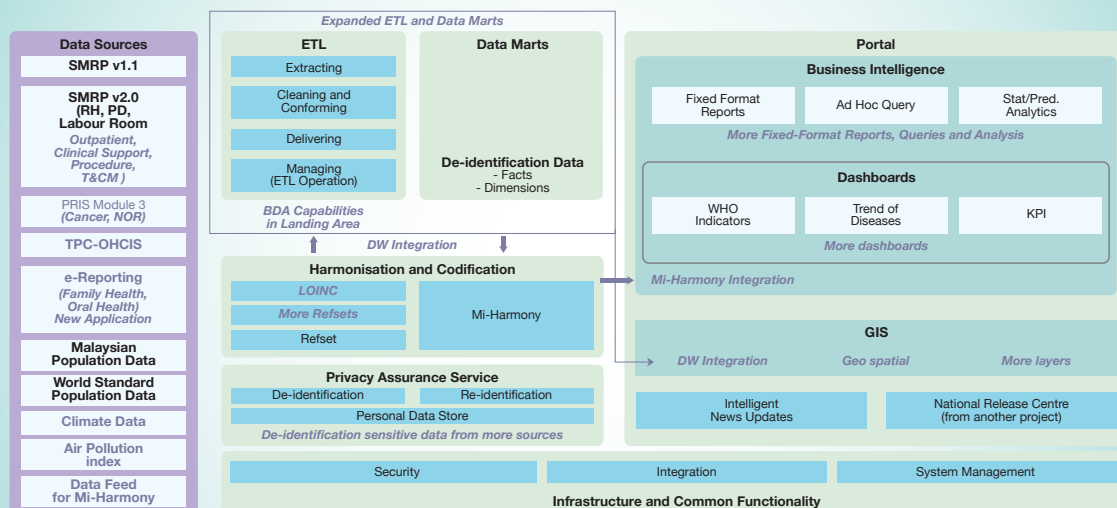


## HOST MACHINES AND RESOURCE UTILISATION

The system comprises a total of 146 virtual machines (VM) actively running in the production system, consisting of:

- MyHDW
- Sistem Maklumat Rawatan Pelanggan (SMRP)
- Patient Registry Information System (PRIS)
- Family Health
- Oral Health
- MyHarmony
- Geographical Information System

| HOSTs | | | Allocated CPU | | Allocated Memory | |
|---|---|---|---|---|---|---|
| **12** | | | 77% | 66300/86400 | 37% | 2.2 TB/5.9TB |
| 0 ON | 0 OFF | 0 ERROR | | | | |

*Each application VM is set up and configured with different set of virtual core, memory and storage sizes according to respective processing load, capacity and software services.*

mimosmalaysia

# MyHDW Malaysian Health Data Warehouse

## INTELLECTUAL PROPERTIES (IPS)

MyHDW is a trusted source of truth of comprehensive healthcare data structured for query and analysis purposes. More than 90 percent of the MyHDW technology is homegrown, and developed by MIMOS. MyHDW has a number of novel features and these are protected through **22 patents** filed at the Malaysia patent office (MyIPO).

| No. | Patent Title | Inventors | Malaysia | | International |
| --- | --- | --- | --- | --- | --- |
| | | | Filed No. (MyIPO) | Grant No. (MyIPO) | Filed No. (PCT) |
| 1 | An Apparatus and Method For Parallel Moving Adaptive Window Filtering Edit Distance Computation | MIMOS | PI 2013004420 | MY-163947-A | PCT/ MY2015/050026 |
| 2 | Automatic Website Template and 3D Skin Generation Based on Images | MIMOS | PI 2012005243 | MY-164092-A | PCT/ MY2013/000219 |
| 3 | A System For Automatic Semantic-Based Mining | MIMOS | PI 20091166 | MY-169563-A | PCT/ MY2010/000033 |
| 4 | System and Method for Issuing EK Credential in Trusted Computing Environment using Local CA | MIMOS | PI 2010002125 | MY-151315-A | PCT/ MY2010/000242 |
| 5 | A System And Method For Predicting Query In A Search Engine | MIMOS | PI 2013702212 | MY-168793-A | PCT/ MY2014/000179 |
| 6 | Adaptive-Window Edit Distance Algorithm Computation | MIMOS | PI 2014701350 | N/A | PCT/ MY2015/050026 |
| 7 | System and Method for Integrated Backup Solution in Virtualization Environment | MIMOS | PI 2014001220 | N/A | PCT/ MY2015/050022 |
| 8 | System and Method For Managing Resources Failure Using Fast Cause and Effect Analysis in a Cloud Computing System | MIMOS | PI 2014001625 | N/A | PCT/ MY2015/050042 |
| 9 | A System Architecture with Cluster File System for Virtualization Hosting Environment | MIMOS | PI 2010005759 | N/A | PCT/ MY2011/000092 |
| 10 | A System and Method For Instant Messaging Platform | MIMOS | PI 2013702291 | N/A | PCT/ MY2014/000177 |
| 11 | A Method for Retrieving Data | MIMOS | PI 2016001698 | N/A | N/A |
| 12 | A System For Providing A Data Element In Relation To Time and A Method Thereof | MIMOS | PI 2015001430 | N/A | N/A |
| 13 | A System and Method to Detect Security Breaches in an Internet of Things Environment | MIMOS | PI 2017000339 | N/A | N/A |
| 14 | Resource Allocation Monitoring in Organization | MIMOS | PI 2016000509 | N/A | N/A |

| No. | Patent Title | Inventors | Malaysia | | International |
| --- | --- | --- | --- | --- | --- |
| | | | Filed No. (MyIPO) | Grant No. (MyIPO) | Filed No. (PCT) |
| 15 | A System and A Method for Identification of a Web Browser | MIMOS | PI 2016000505 | N/A | N/A |
| 16 | A Method for Generating One-Time Keys for Single Line Authentication | MIMOS | PI 2016001041 | N/A | N/A |
| 17 | Secure Communication Mechanism Between Applications On A Computing Device | MIMOS | PI 2015001988 | N/A | N/A |
| 18 | System and Method for Online User Registration | MIMOS | PI 2015002794 | N/A | N/A |
| 19 | System and Method For Assessment Of User State Of Mind | MIMOS | PI 2017705163 | N/A | N/A |
| 20 | System and Method for Semantic-Based Data Harmonization | MIMOS | PI 2015001695 | N/A | N/A |
| 21 | System and Method for Medical Documentation and ICD Coding | MIMOS & MOH | PI 2017001118 | N/A | N/A |
| 22 | System and Method for Harmonization and Semantic Analytics of Data | MIMOS & MOH | PI 2017001120 | N/A | N/A |

## PUBLICATIONS

**1**. Md. Khadzir Sheikh Ahmad, ʿIsmat Mohd Sulaiman, Mohd Syazrin Mohd Sakri, Omar Ismail, Muhammad Aiman Mazlan, Abdul Aziz Latip. (2019) **"Integrating MyHarmony (Harmonization & Codification of Unstructured Data using SNOMED CT) with Malaysian Health Data Warehouse"**, *SNOMED CT EXPO 2019*, Kuala Lumpur, Malaysia.

**2**. Abdul Aziz Latip, Sharipah Setapa, ʿIsmat Mohd Sulaiman, Muhammad Aiman Mazlan, Mohd Syazrin Mohd Sakri, Duc Nghia Pham, Ong Hong Hoe, Wan Zawawi Md Zin and Md. Khadzir Sheikh Ahmad. (2018) **"Data Acquisition Challenges in Health Industries for Big Data Analytics"**, *3rd International Saudi Health Informatics Conference (ISHIC 2018)*, Riyadh, Saudi Arabia.

3. Farouq Hatem Hamad, Norlisa Ahmad Termizi, Muhammad Aiman Mazlan. (2018) **"Implementation of GIS Access Control for Feature Services"**, *3rd International Saudi Health Informatics Conference (ISHIC 2018)*, Riyadh, Saudi Arabia.

4. Md. Khadzir Sheikh Ahmad, ʿIsmat Mohd Sulaiman, Mohd Syazrin Mohd Sakri, Mohd Firdaus Mohamed Khairi, Muhammad Aiman Mazlan, Abdul Aziz Latip. (2018) **"SNOMED CT Generating Cardiology Key Performance Indicators (KPIs)"**, *SNOMED CT EXPO 2018*, Vancouver, Canada.

## ACHIEVEMENTS

1. **SHARE/GUIDE's ICT Award 2019** awarded by SHARE/GUIDE Association, Malaysia's IT Users Group.
2. **Recognition of Excellence Award 2018** conferred by OpenGov Asia.