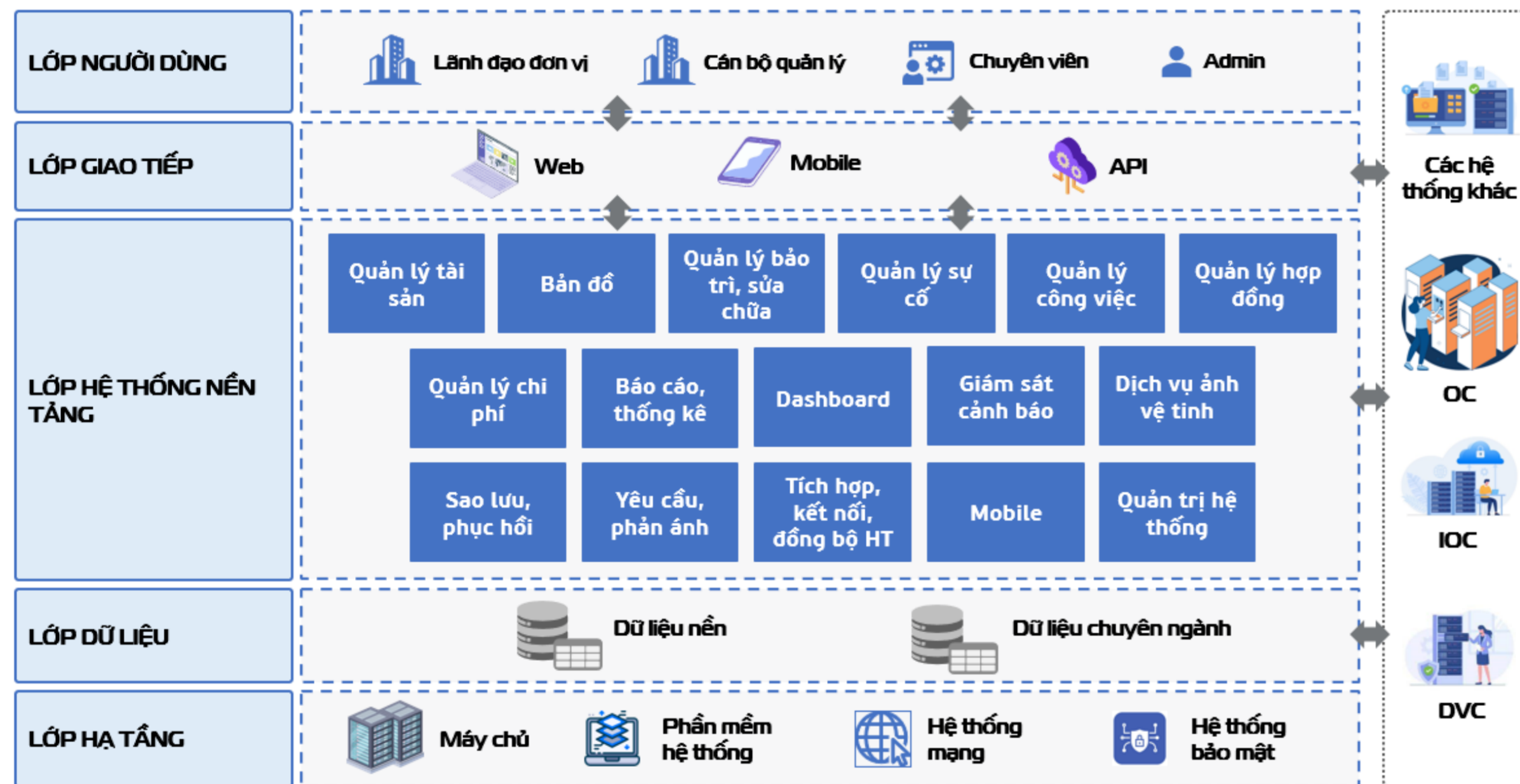


SmartWard development technology

June 2025

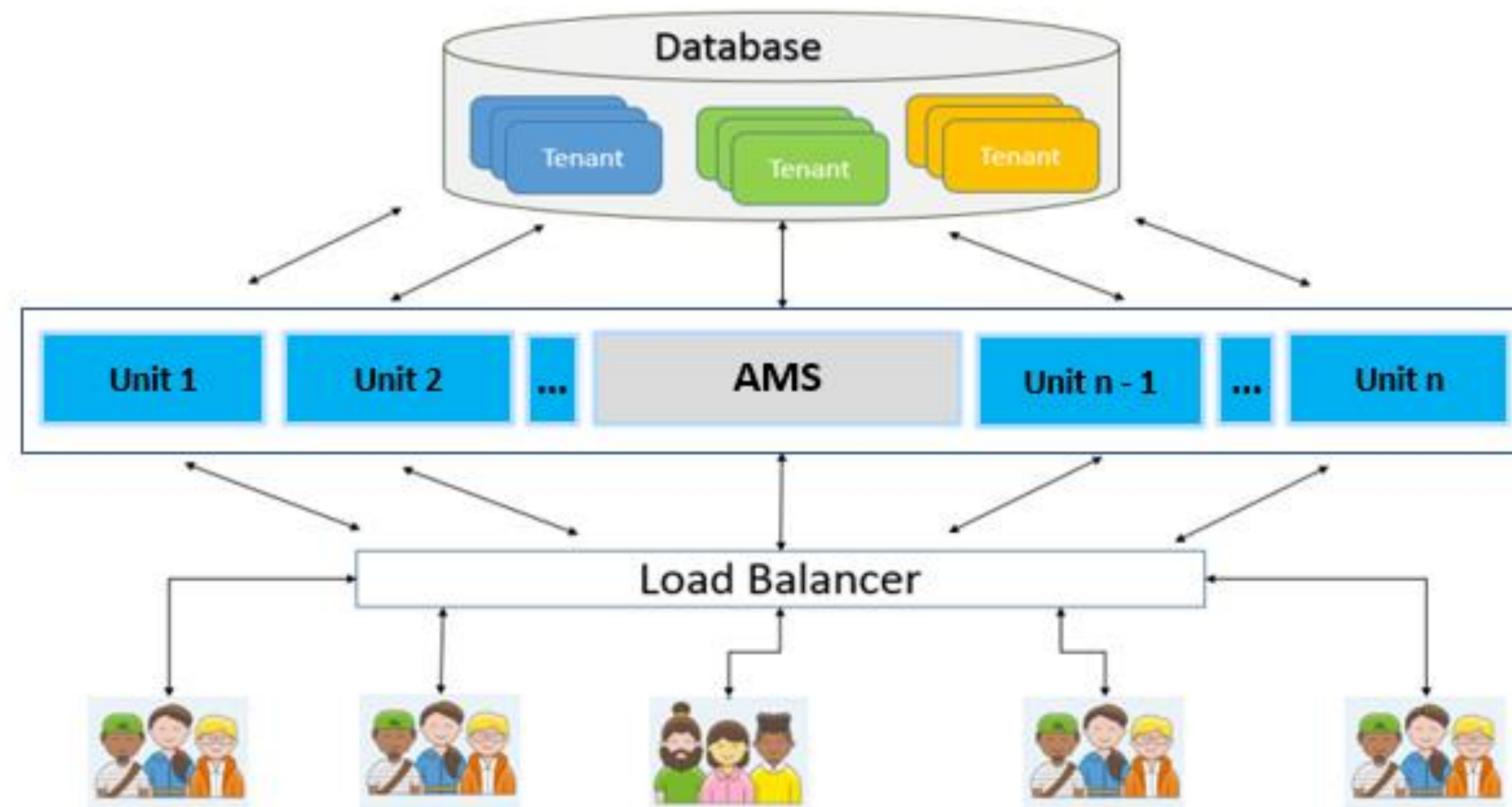
The system architecture is built in accordance with the Vietnam e-Government Architecture framework, in order to enhance the ability to connect and exchange; increasing the ability to exploit and update information, minimizing information duplication between units.



- SmartWard uses a series of the most modern and advanced technologies today.
- The combination of multiple technologies allows the system to be opened and customized quickly, increasing the speed of system development, data upload speed, and system performance.

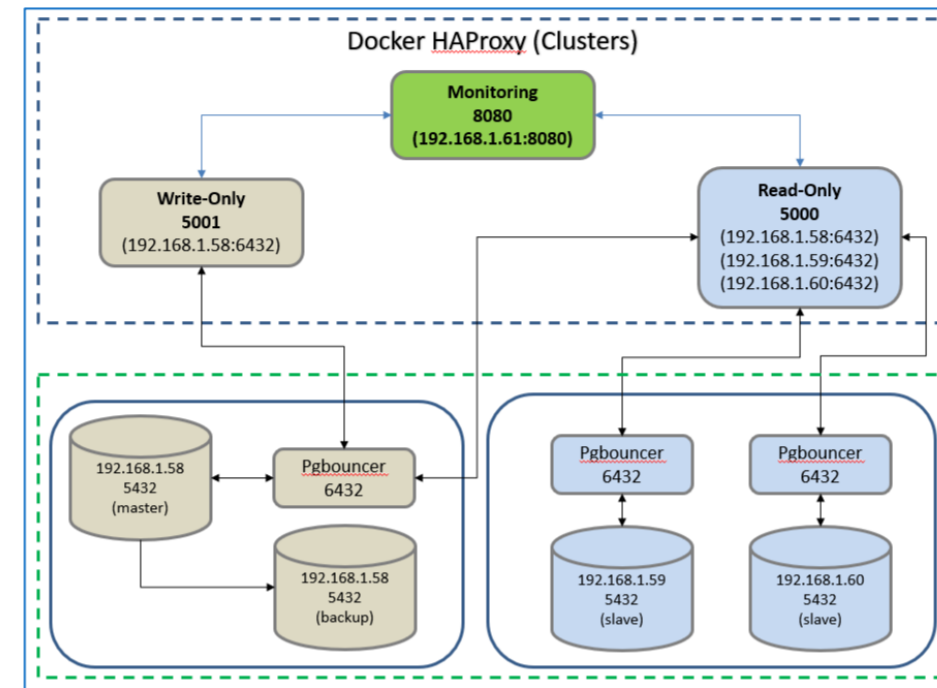


- SmartWard uses a Multi-tenant architecture. This architecture allows for the rapid deployment of a new tenant without having to fix the system
- Database, system, configuration... of tenants are independent of each other to ensure privacy and security



SmartWard HA/Master slave/Multinode/Docker swarm

- The system is deployed in the form of HA (high availability) architecture that allows millions of visits to the system without overloading the system.
- Apply a master slave architecture to the system's application layer to distribute access flows.



HAProxy Statistics Report for pid 99 on 18e01b4262cb

> General process information

pid = 99 (process #1), rtproc = 1, nbthread = 4
 uptime = 14d 23h 54m 01s
 system limits: memmax = unlimited, ulimn = 1048576
 maxsock = 1648576, maxconn = 524288, maxpipes = 0
 current conn = 2, current pipes = 0, conn rate = 1/sec, bit rate = 0.271 kbps
 Running tasks: 1/27, idle = 100 %

Legend: active UP, active UP going down, active DOWN, going up, active or backup DOWN, active or backup DOWN for maintenance (MAINT), active or backup SOFT STOPPED for maintenance, Note: "NOLOADDRAIN" = UP with load-balancing disabled

Display option: External resources: Hide TCP/UDP services, Disable refresh, Refresh now, CSV export

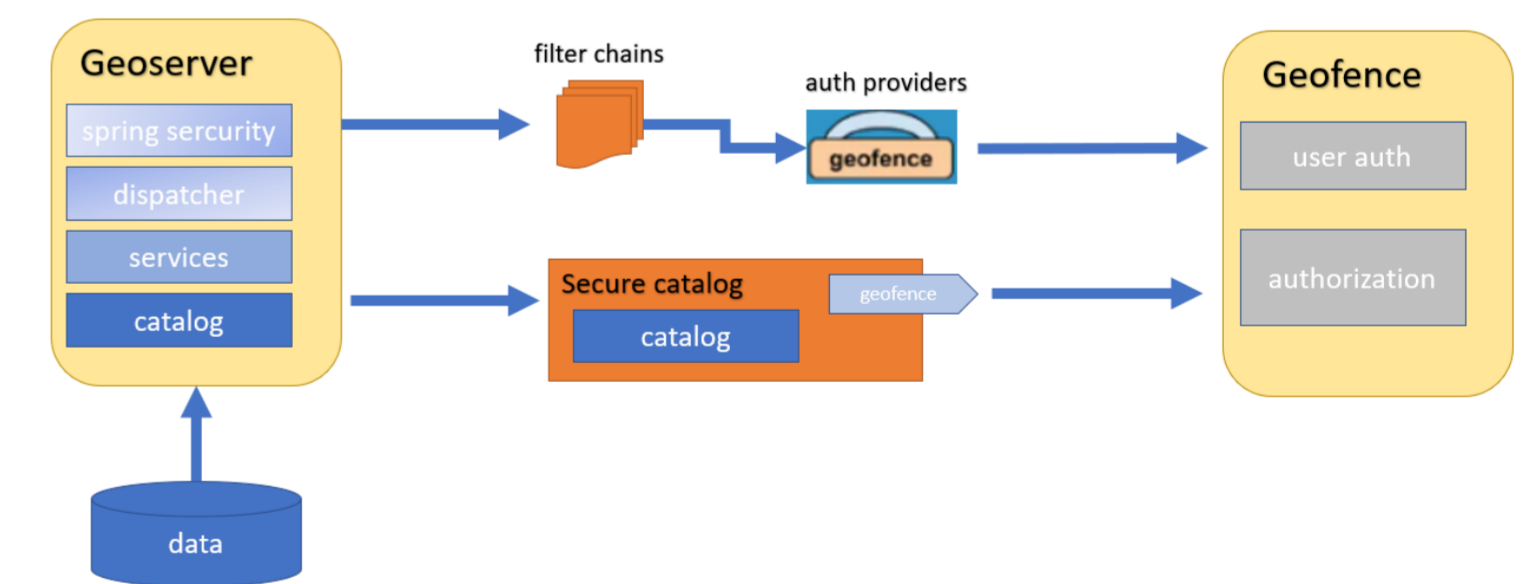
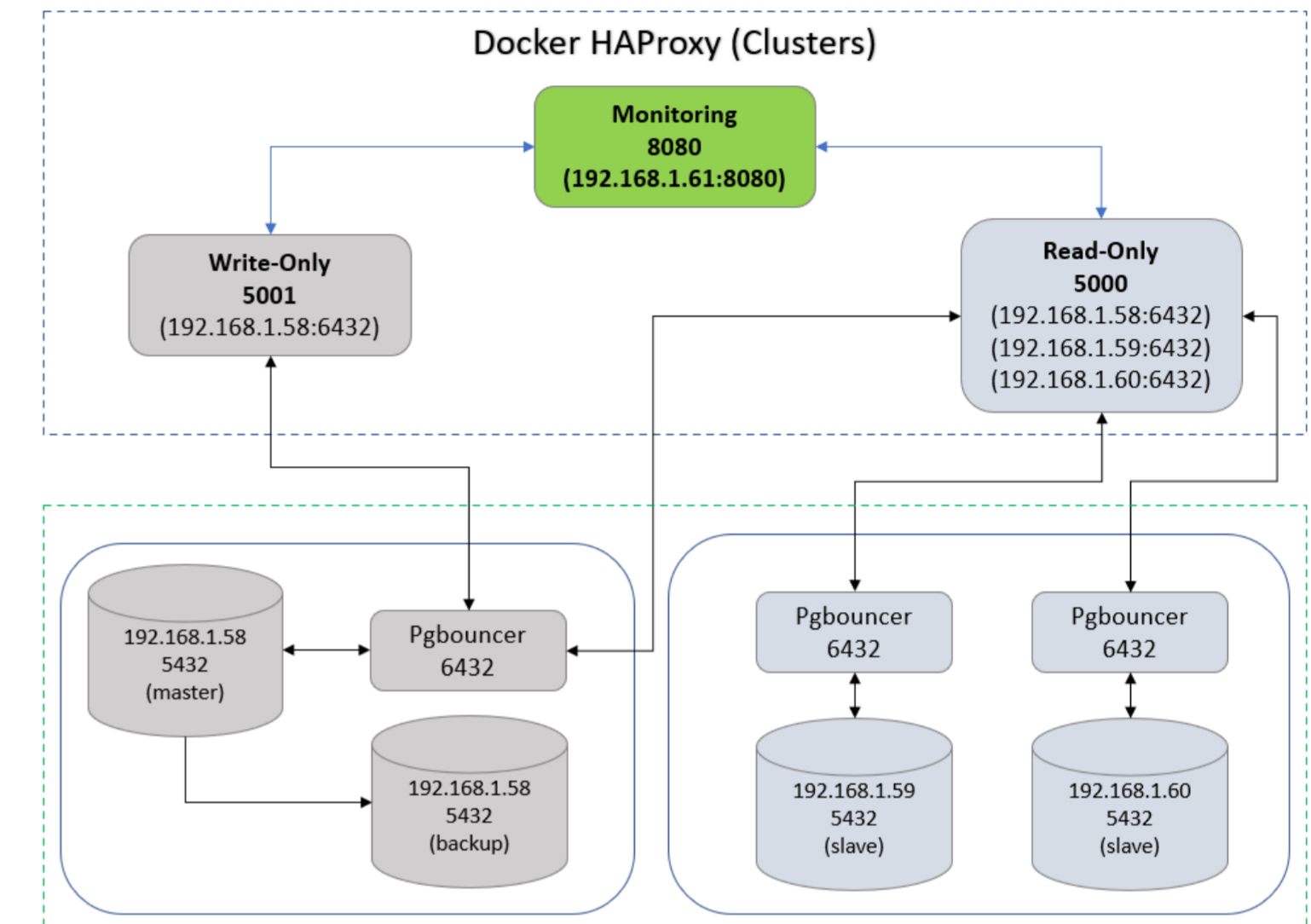
haproxy_read		Queue	Session rate			Sessions			Bytes	Denied	Errors	Warnings	Status	Server															
Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	LastChk	Wght	Act	Bck	Chk	Dwn	Dwtime	Thrtle	
0	0	1	0	1	0	2	524 288	1	578	3 092	0	0	0	0	0	0	0	0	0	0	OPEN								
0	0	-	0	0	0	0	100	0	0	0	?	0	0	0	0	0	0	0	0	0	L7OK0 in 3ms	2	Y	-	115	12	0s	-	
0	0	-	0	0	0	0	100	0	0	0	?	0	0	0	0	0	0	0	0	0	7d20h LP	L7OK0 in 2ms	1	Y	-	118	13	0s	-
0	0	-	0	1	0	1	-	1	1	7d22h	578	3 092	0	0	0	0	0	0	0	0	8d16h LP	L7OK0 in 2ms	1	Y	-	10	4	0s	-
0	0	0	1	0	1	1	52 427	1	1	7d22h	578	3 092	0	0	0	0	0	0	0	0	8d16h LP		4	3	0	4	5h20m		

haproxy_write		Queue	Session rate			Sessions			Bytes	Denied	Errors	Warnings	Status	Server															
Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	LastChk	Wght	Act	Bck	Chk	Dwn	Dwtime	Thrtle	
0	0	-	0	3	0	3	524 288	11	4 170	558	0	0	0	0	0	0	0	0	0	0	OPEN								
0	0	-	0	3	0	2	-	11	14d15h	4 170	558	0	0	0	0	0	0	0	0	0	8d16h LP	L7OK0 in 2ms	1	Y	-	10	4	0s	-
0	0	0	3	0	2	2	52 427	11	11	14d15h	4 170	558	0	0	0	0	0	0	0	0	8d16h LP		1	1	0	4	5h22m		

stats		Queue	Session rate			Sessions			Bytes	Denied	Errors	Warnings	Status	Server														
Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	LastChk	Wght	Act	Bck	Chk	Dwn	Dwtime	Thrtle
1	6	-	2	5	10	2 918	1 735	155	42 190 712	0	0	1 158	0	0	0	0	1 700	0	0	0	14d22h LP		0	0	0	0		
0	0	0	6	0	1	1	1 700	0	0s	1 735 155	42 190 712	0	0	0	0	0	1 700	0	0	0	14d22h LP		0	0	0	0		



- Multi-node architecture helps increase load capacity, improve system performance.
- The Docker swarm architecture helps deploy the system in a distributed form, scaling the system horizontally.

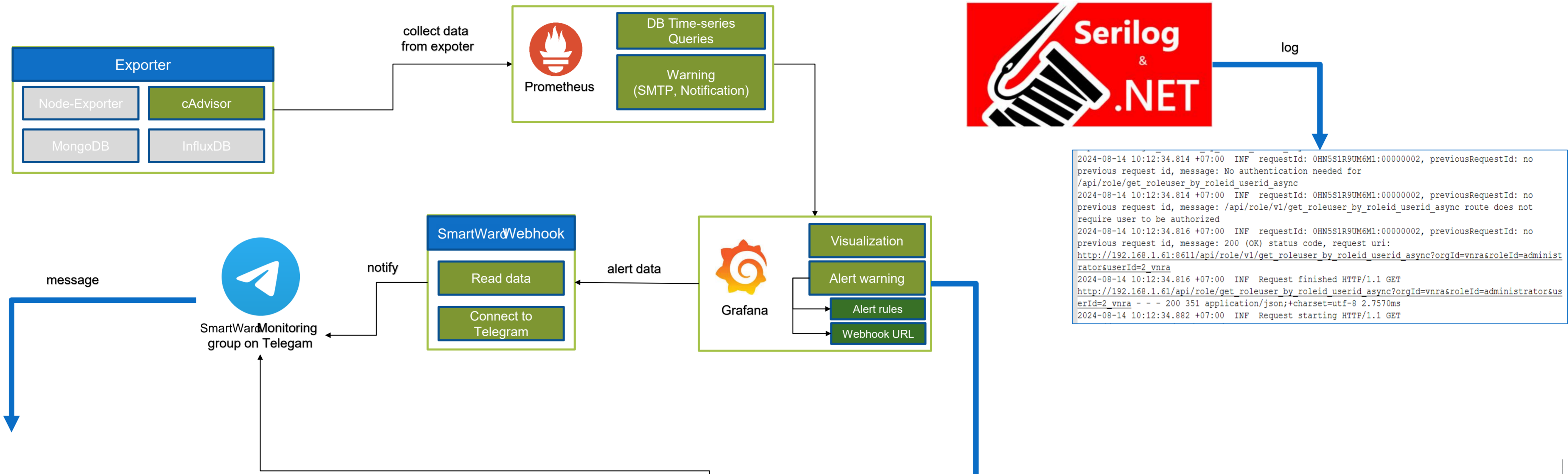


SmartWard is deployed with specialized components, allowing for enhanced safety, security, performance, and simplicity in the process of upgrading and maintaining the core system, and the system information is well controlled and centralized.

Examples of components on a map page:

SmartWardEvent_Map_Interaction		
<ol style="list-style-type: none">1. Tìm kiếm chung – Keyword.Search.Component2. Tìm kiếm địa danh – Local.Location.Search.Component3. Khu vực / Đơn vị quản lý – Branch.Component4. Bản đồ nền – Basemap.Component5. Bản đồ chuyên đề - Thematic.Map.Component6. Lớp bản đồ - Layer.Group.Component7. Xuất bản đồ - Export.Map.Component8. Biểu đồ thống kê – Statistic.Chart.Component9. Thông tin chi tiết tài sản – Asset.Info.Component	<ol style="list-style-type: none">1. Bản đồ - Map.Component2. Time.Slider.Component3. FilterMap4. Bookmark.Component5. Measure.Component6. Identify.Component7. Toolbar.Component8. Scale.Component9. Rotation.Component10.Compass.Component11.GetLocation.Component	<ol style="list-style-type: none">1. Tìm kiếm theo tọa độ - Coor.Search.Component2. Tìm kiếm theo địa danh (service online) – Online.Location.Search.Component3. Truy vấn thuộc tính – Attr.Query.Component4. Truy vấn không gian – Spatial.Qquery.Component5. Kết quả tìm kiếm – Result.Component6. Selection set – Selection.Set.Component7. Chú giải – Legend.Component8. Danh sách lớp bản đồ - TocControl.Component9. Analysis visualization – AV.Component

SmartWard is deployed with specialized components, allowing for enhanced safety, security, performance and simplicity in the process of upgrading and maintaining the core system, system information is well controlled and centralized.



SmartWard - System Monitoring and Setting Schedules for Data Backup

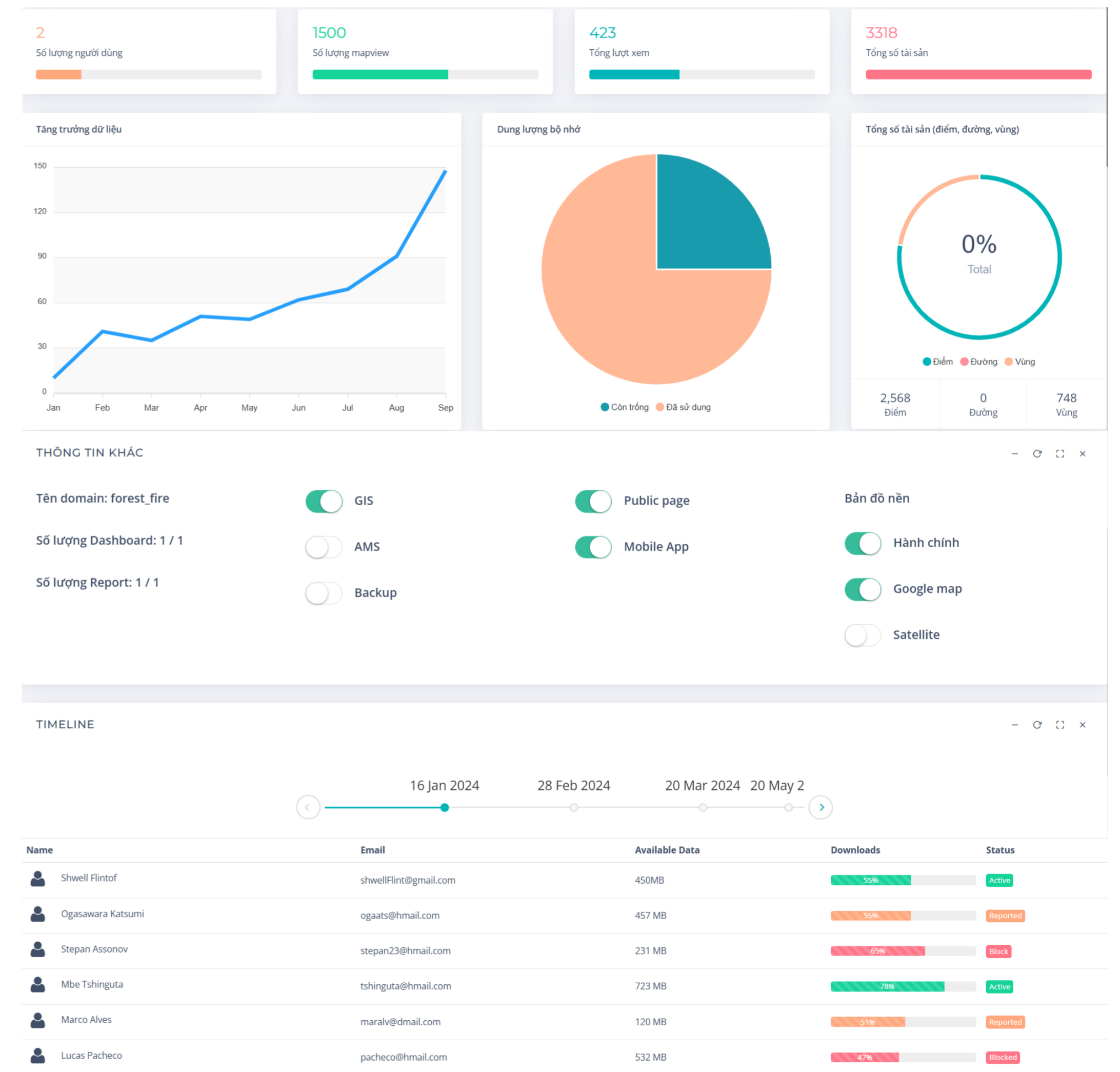
- Dashboard monitors the system through parameters
- Allow data backup and set up automatic backup schedules:
 - Databases
 - Images/ Documents
 - Spatial data
 - System configuration

Cơ sở dữ liệu
 Ảnh/tài liệu
 Dữ liệu không gian
 Cấu hình hệ thống

Sao lưu cơ sở dữ liệu

Hoặc đặt lịch

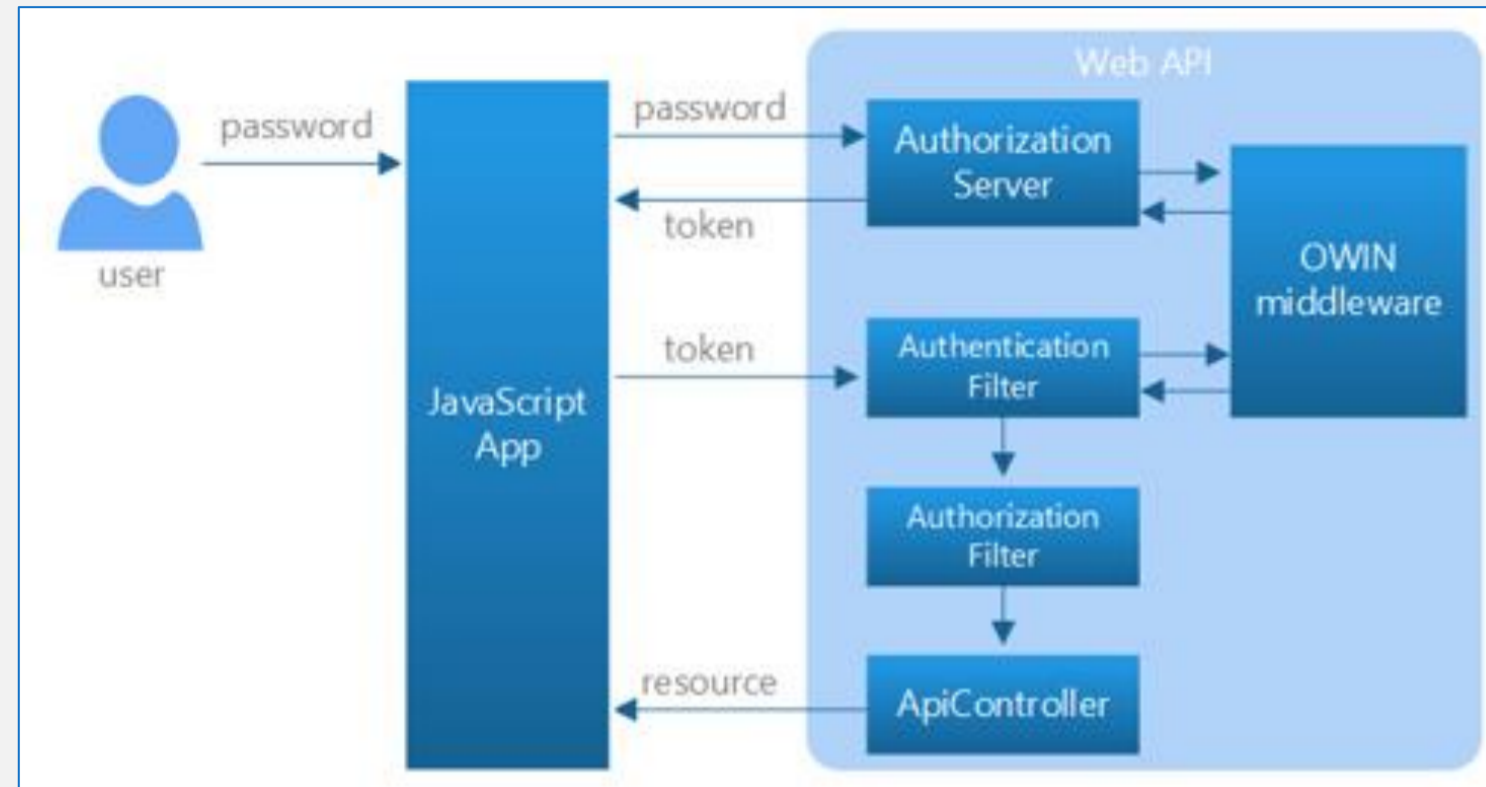
Hàng ngày
Thứ 2
12
giờ
0
phút
Lưu



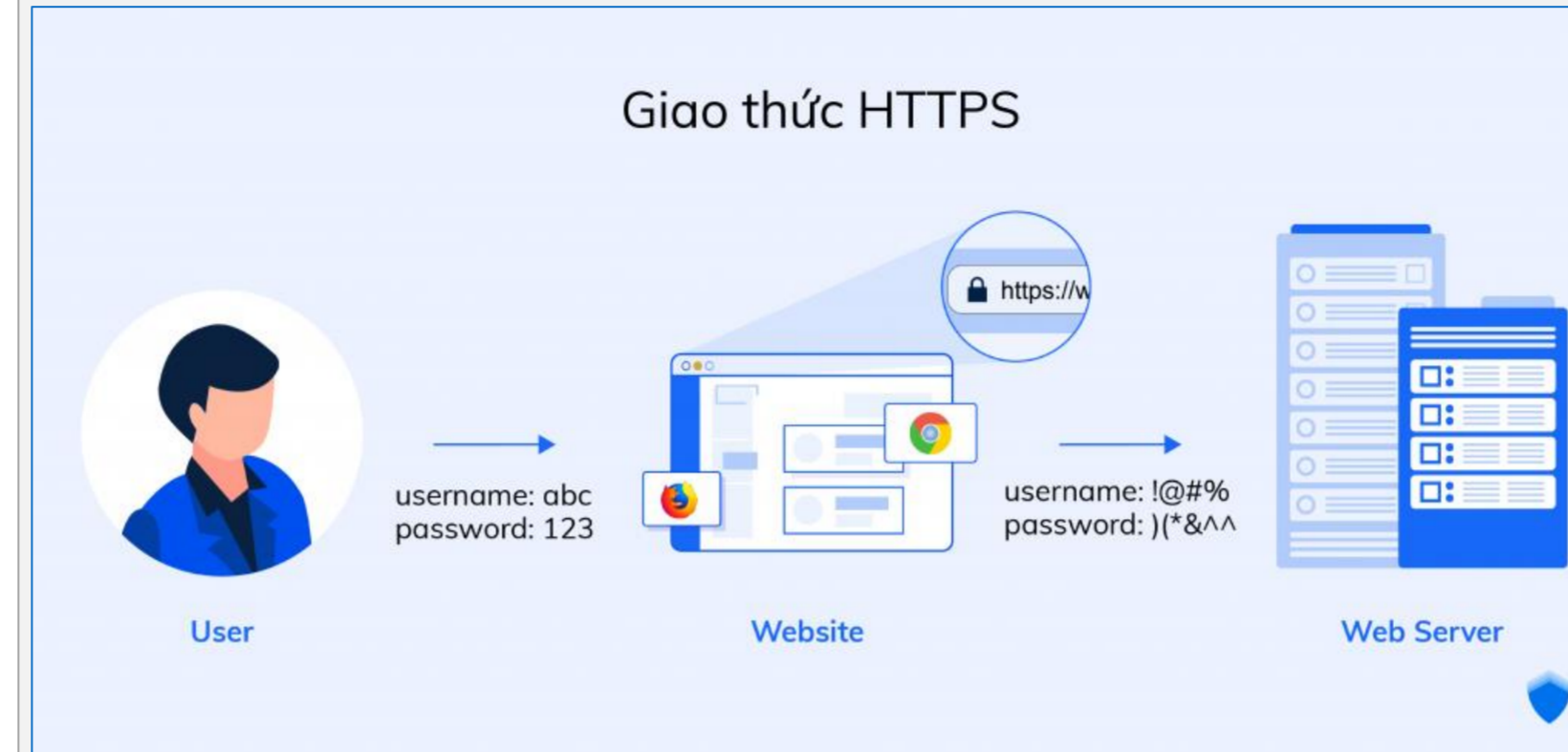
- The database structure changes to suit the management needs of each unit.
- Easily add new management objects and management information in database.
- Import spatial data, attribute data into the database through excel files, shapefiles quickly.
- Unlimited amount of data in the database.

- The system development process flexibly changes to meet the actual needs of each unit.
- The development process is optimized, saving software development costs for organizations.
- The steps to develop the system are shortened, quickly put the system into operation and use.

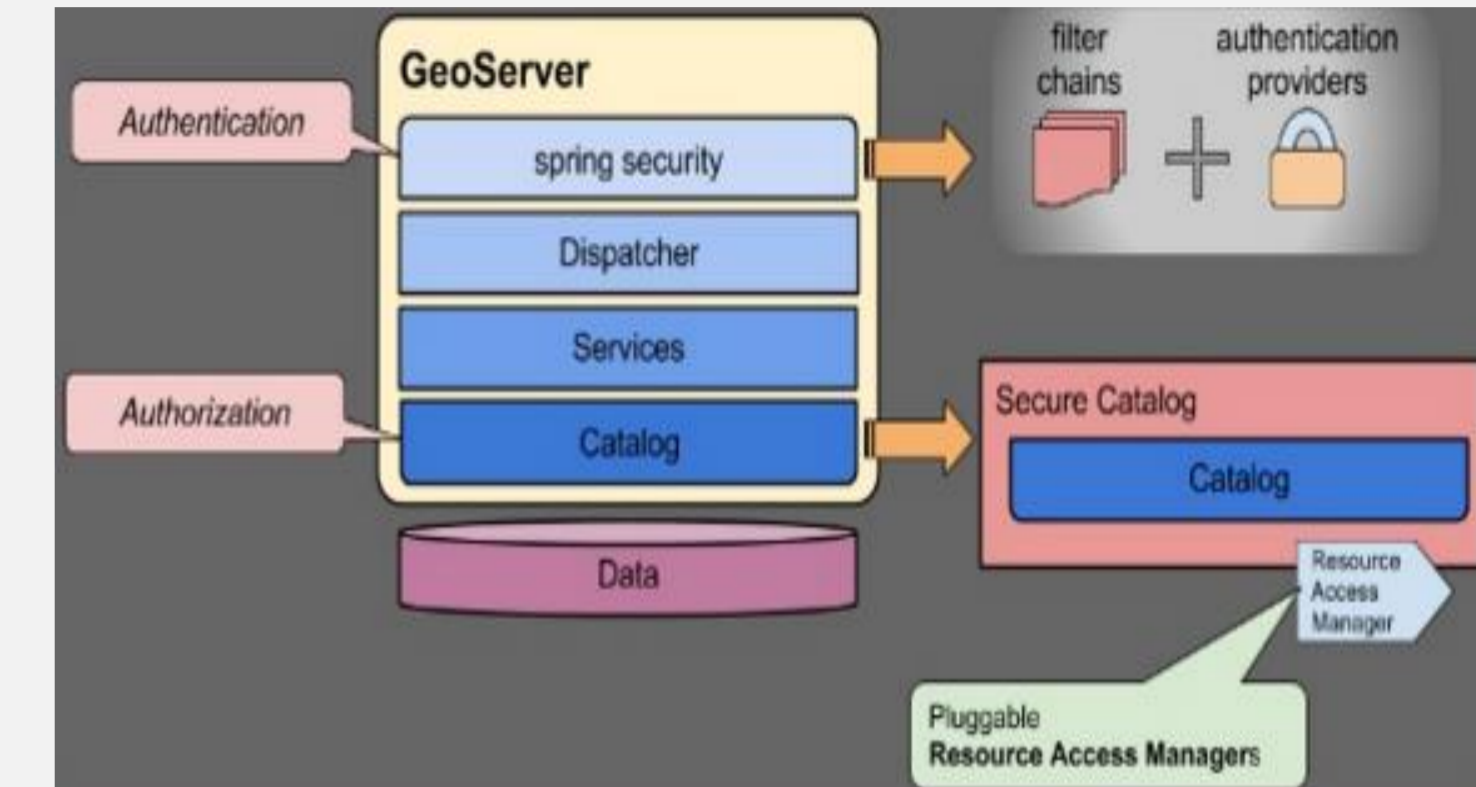




- Build MultiTenant architecture for applications, databases, geoservers, using the Master-Slave mechanism.
- Grant access when calling data through Web API.



- SSL/TLS internet connection security.
- SSL encryption on transmission and account information encryption according to MD5 and HMACSHA256 standards on transmission and database.

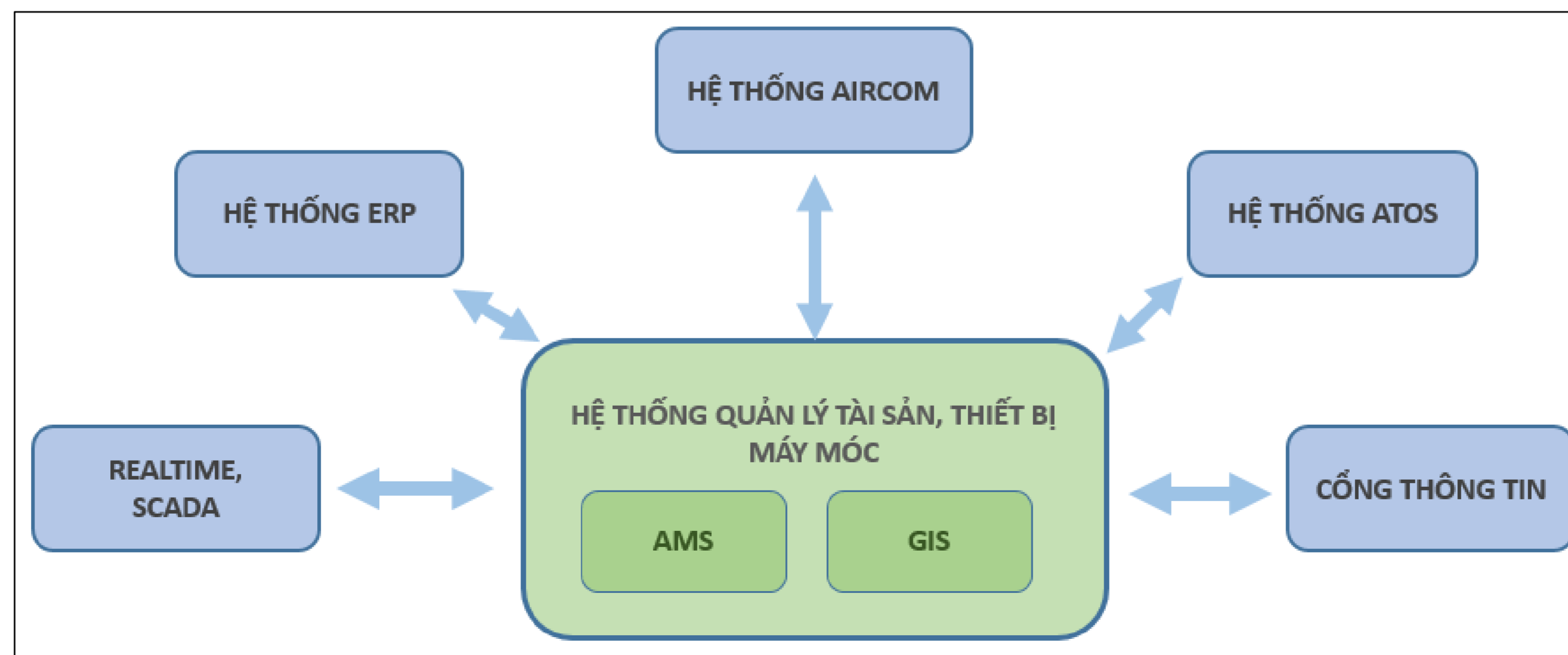
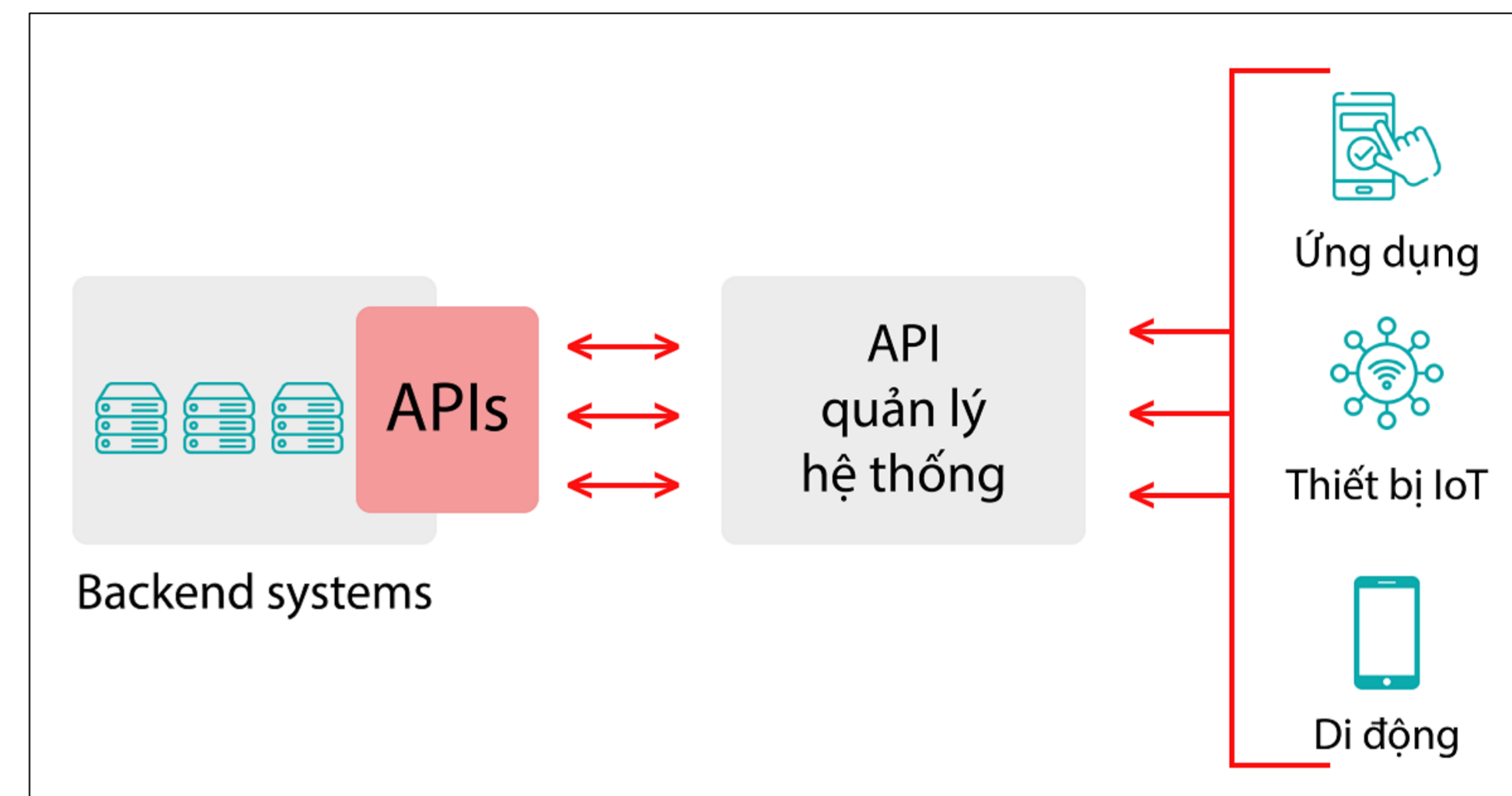


Security in database:

- Authentication using Spring Security is developed from the Spring Framework.
- Authorization mechanism to authenticate access to services and layers through Catalog Mode and Access Mode.

SmartWard System Integration

- SmartWard is ready to integrate and share data and systems through APIs on demand.
- Sharing data for other systems: smart cities, logistics, shared GIS systems of the province, etc.
- Integrate and connect with other sector databases (Industry and Trade, Agriculture, Natural Resources and Environment...) and other systems.



Thank you!

- **GIS solution**
 - **Map**
- **GIS database**
 - **SDI**
 - **SmartWard**
- **Satellite image**
- **Digital elevation model**

planet.

Synspective

INTERMAP