FaMe Facility Management System (CAFM) with Smart Building extension

Technical Design Document

- Infrastructure Requirements and Hardware sizing
- Solution Architecture
- Deployment Architecture
- Technology Stack
- Business Continuity and Disaster Recovery Policy

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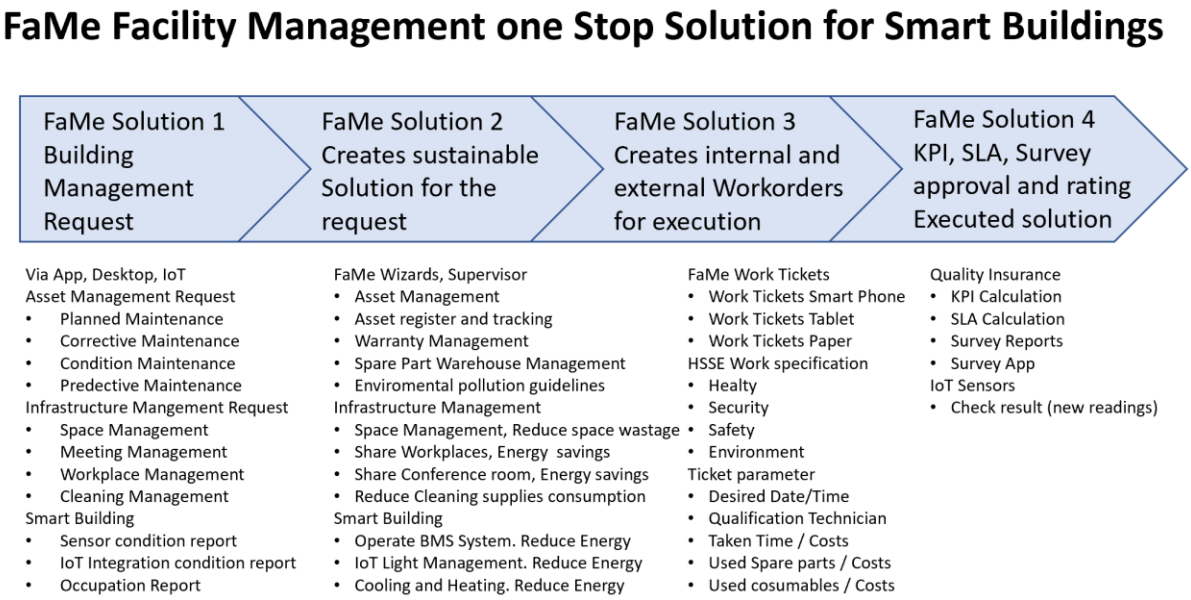
1. Introduction



1.1 Purpose

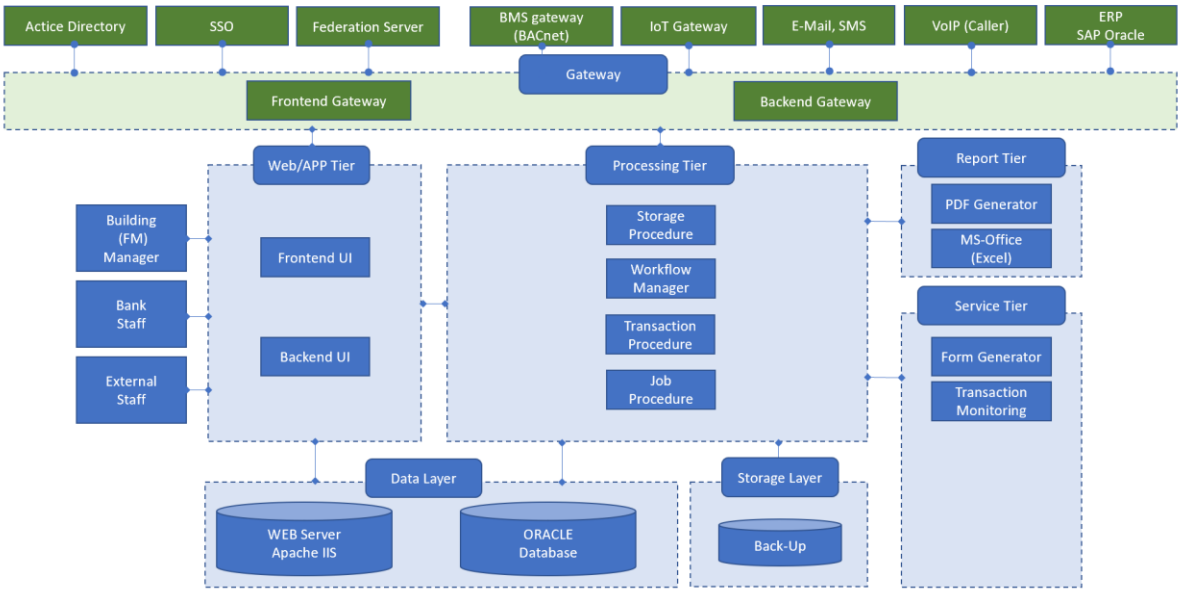
This documentation outlines the technical details of the FaMe CAFM Solution with Smart Building extension.

1.2 Scope

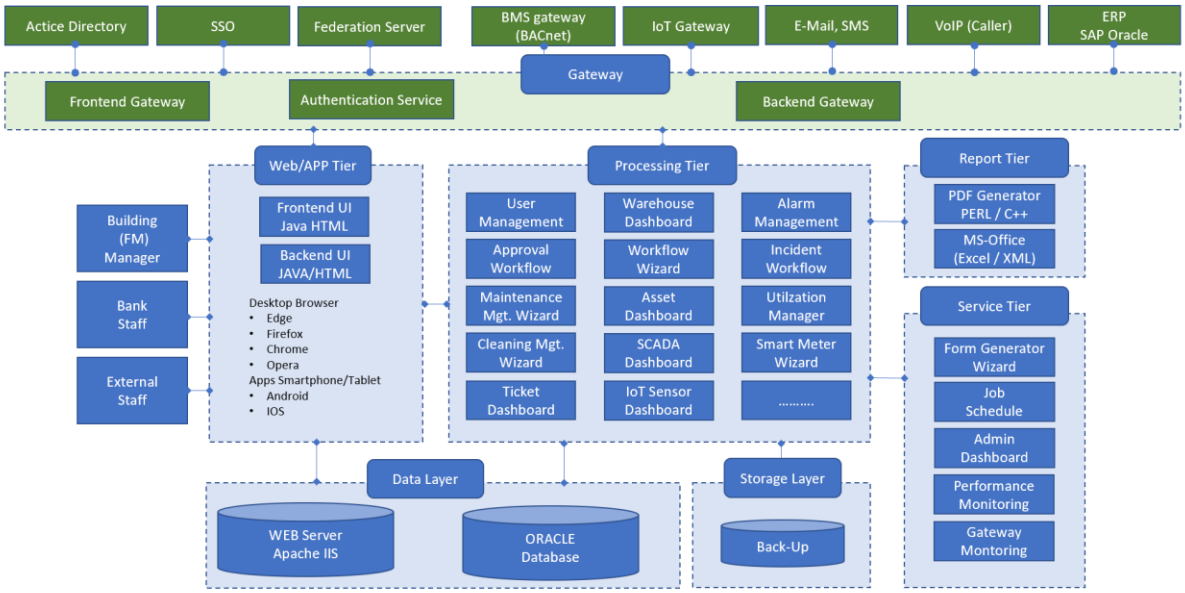
This documentation explains the technical aspects related to the FaMe Facility Management (CAFM) System and the FaMe Smart Building Solution.

2. Architecture

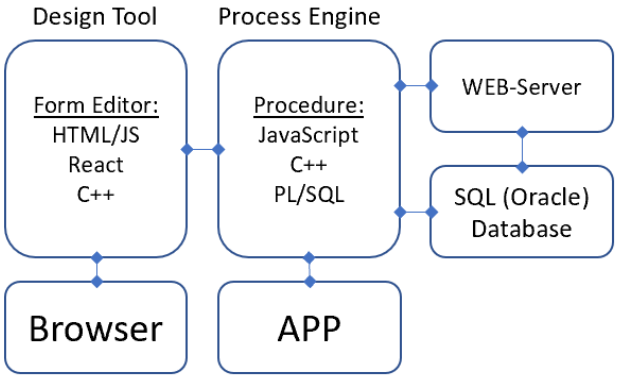
2.1 System Architecture



2.2 Micro Service Architecture

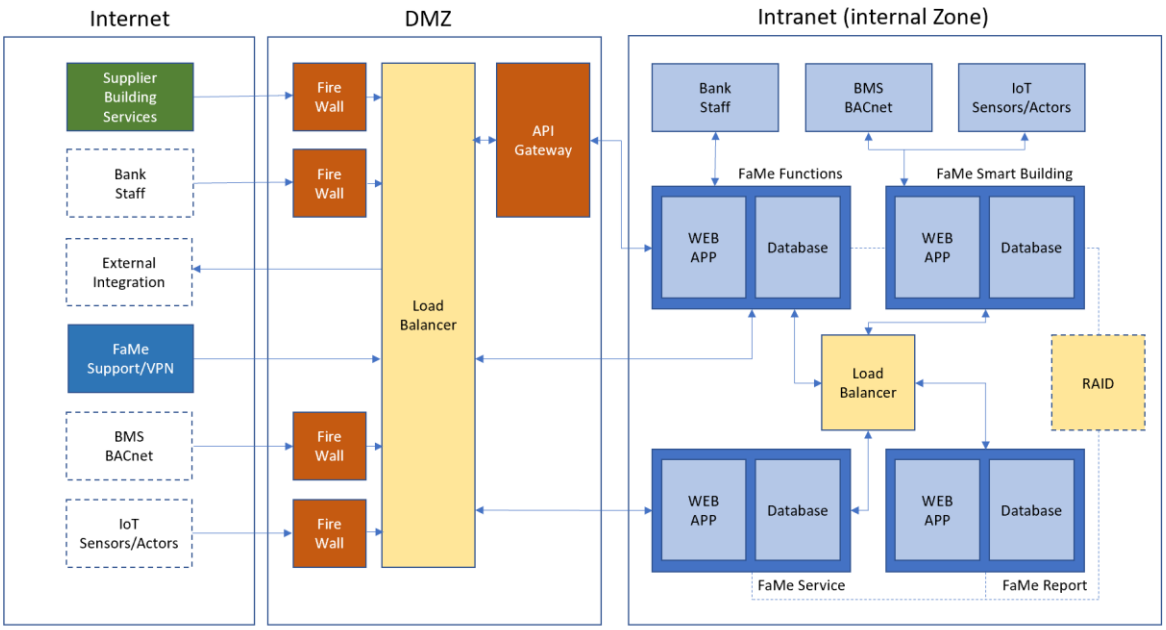


2.3 Customizing Environment



Customizing and Support with Remote Access (option). FaMe developer use Browser based Form Designer (HTML, JS ..) and App design Tool (SQL, PERL, C++..) for process design.

2.4 Deployment Architecture



3. Hardware Sizing & Capacity Considerations

3.1 Minimum Hardware Requirements SIT

Module	Count	Core	RAM (GB)	Storage (GB)
FaMe UI	1	4C	64	200
FaMe Transactions	1	4C	64	1000
FaMe IoT Interface	1	4C	32	100
FaMe Report	1	4C	32	100

3.2 UAT Hardware Requirements

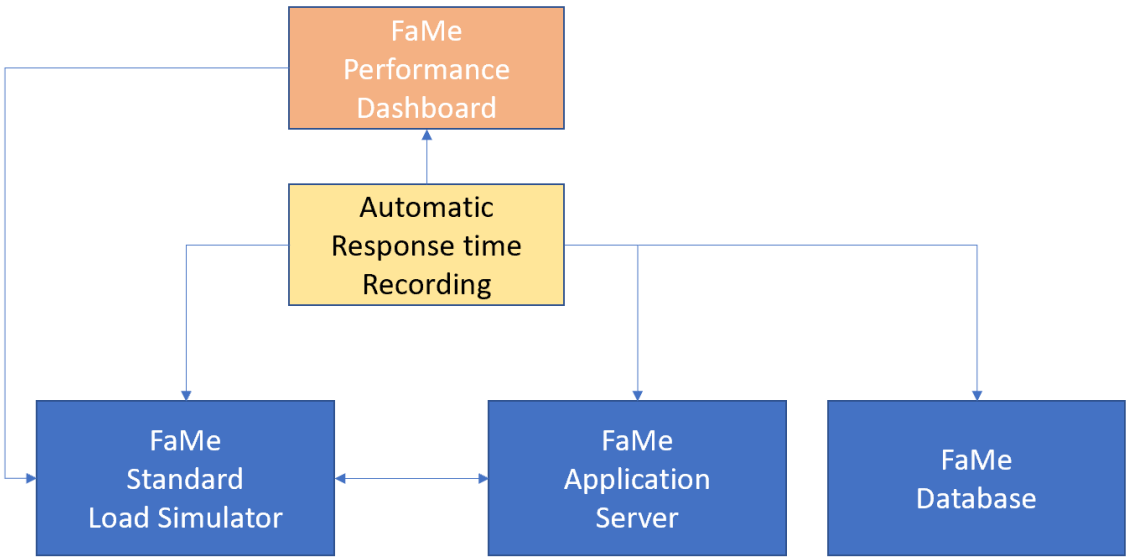
Module	Count	Core	RAM (GB)	Storage (GB)
Ticket System Desktop WEB/APP	1	4C	32	20
Ticket System APP	1	4C	32	20
Ticket System DB	1	4C	32	20
Maintenance Desktop WEB/APP	1	4C	32	20
Maintenance System APP	1	4C	4	20
Maintenance System DB	1	4C	32	20
Cleaning/SoftService Desktop WEB/APP	1	4C	32	20
Cleaning/SoftService System APP	1	4C	32	20
Cleaning/SoftService System DB	1	4C	32	20
Smart Building Desktop WEB/APP	1	4C	32	20
Smart Building System APP	1	4C	4	20
Smart Building System DB	1	4C	32	20
Reporting Desktop WEB/APP	1	4C	32	20
Reporting Building System DB	1	4C	32	20
Service WEB/APP	1	4C	32	20
Service System DB	1	4C	32	20

3.3 Production Hardware Requirements

	Quantity	Core	RAM (GB)	Storage (GB)	Description	OS
Application and WEB Server	1	4C	16	500	WEB Server IIS, Apache	Windows 2016/19/22/ RedHat 7/8, Oracle Linux
Database Server (ORACLE)	1	4C	32	1000	Data Server	Windows 2016/19/22/ RedHat 7/8, Oracle Linux
Report Server (PDF)	1	4C	16	100	Report (PERL)	Windows 2016/19/22/ RedHat 7/8, Oracle Linux
IoT Broker	1	4C	16	100	IoT Interface	Windows 2016/19/22/ RedHat 7/8, Oracle Linux

Web/application server, IoT broker, and PDF writer may me run on the same machine.

3.4 Benchmark Report



Performance check with FaMe reference installation and FaMe Server.

Performance check (part of FaMe production installation) at production server.

Compare performance during setup

Check performance during production

Test configuration Reference Server:

Database server

- Windows 2016, 2019, or 2022 Server
- 2 CPUs 2.0 GHz
- Memory 16GB
- Hard Disk 200 GB

Web server

- Windows 2016 or 2019 Server with IIS
- 2 CPUs 2.0 GHz
- Memory 16GB
- Hard Disk 200 GB

Application server

- Windows 2016 or 2019 Server with IIS
- 2 CPUs 2.0 GHz
- Memory 16GB
- Hard Disk 200 GB

Test (5 cycles):

- Create 100 Tickets concurrently with 100 Users
- Create 1000 Tickets concurrently as the same user
- Run 1000 IoT actions
- Create Report with 1000 Records (Tickets)
- Display Dashboard with 1000 Tickets

Record average time and peak time

4. Technical Stack and Integrations

4.1 Technical Stack

No.	Package	Category	License	Version
1	IIS (MS Internet Information Server)	Web	Microsoft	8.5 and 10
2	Oracle Enterprise Standard Edition	Database	Oracle	19C
3	PDF Writer	Web	FaMe	2.4
4	PDFlib library	PDF	PDFlib.com	10.0
5	Perl Interpreter	PDF	Open Source	5.28, 5.30, or 5.32
6	Tomcat server	IoT	Open Source	8.5 - 10
7	Windows Server	OS	Microsoft	2016, 2019, 2022
8	Apps native	OS	Android	11,12,13
9	Apps native	OS	iOS	12,13,14

4.2 Available Integrations

API Integration (ongoing process) Standard

Windows Single Sign-on (SSO), IIS-based

LDAP API

Federation Server API

PDF Writer API

PERL API

E-Mail SMTP API

BACnet API

IoT Broker API

Nagios API

Selected SAP interfaces (BAPI)

File-based data exchange

5. Business Continuity Considerations

5.1 Monitoring

5.1.1 Hardware Level

Base Rules:

CPU and Memory utilization should not exceed 85%

Disk storage utilization should not exceed 80%

5.1.2 Application Service Level

The FaMe application dashboard monitors the application's operation.
Alarms are generated automatically by the system.
IT personnel can refer to the dashboard.

Monitoring systems can run checks to ensure the web server, the database, the FaMe application in general and its interfaces are up and running.

5.2 Backup and Recovery Considerations

The following backup policy is recommended for the database server:

Set ORACLE retention policy to 24 hours or more.

Back up using RMAN (Oracle recovery manager).

Perform 2nd-level incremental backups daily.

Perform 1st-level incremental backups every week.

Perform full backups every month.

Long-time archival of these backups is done based on the system owner's backup policy.

The following backup policy is recommended for the app and web server:

The web and application servers do not store any application data.
Regular backups schedules are sufficient for these servers.

5.3 Data Retention

Recommended duration is 10 years.

5.4 Disaster Recovery

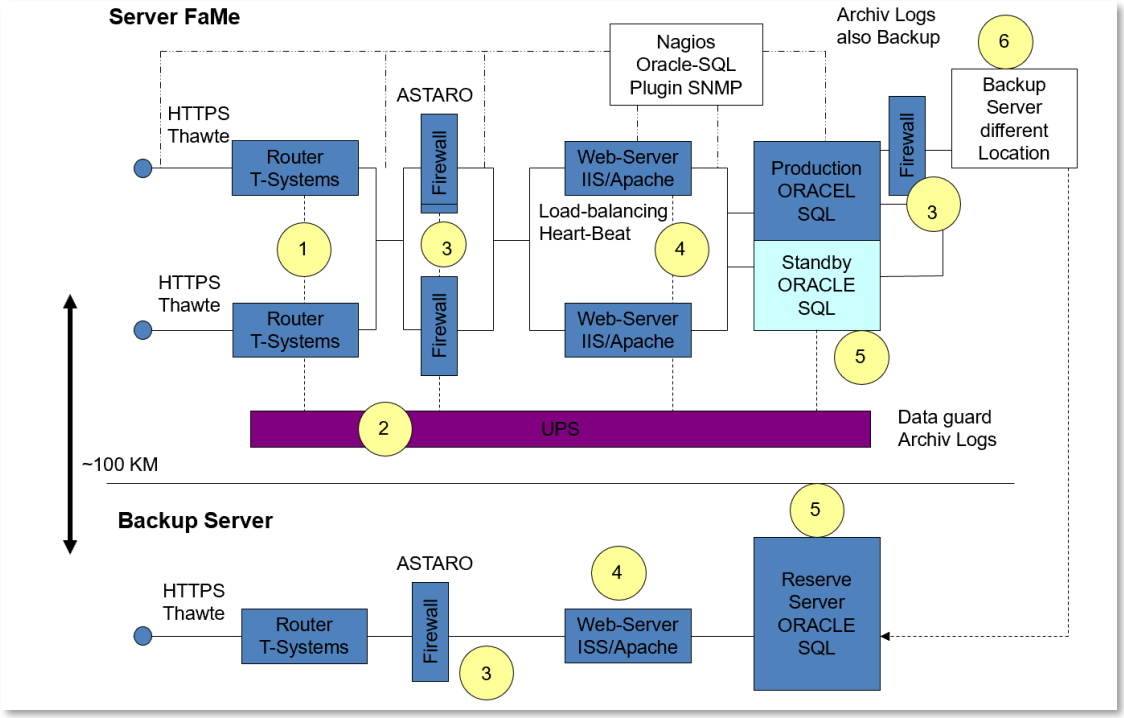
System	Criticality	Stand Alone Configuration	Redundant Configuration
Database	High	60 min	zero
Web Server	High	60 Min	zero
Application Server	High	60 min	zero
Report Server	Medium	120 min	zero
E-Mail Interface	High	60 Min	zero
IoT Interface	High	10 Min	zero
BACnet Interface	High	10 Min	zero

5.5 High Availability (If required)

Webserver: 2 or more servers with Load Balancing or round robin DNS.

Database: Oracle RAC (real application clusters) provides the availability to deploy additional servers running parallel to improve performance or provide a failover option. This requires extra Oracle licensing and uses a shared file system (SAN).

Alternately, a backup database server may be set up (Oracle data guard configuration). The backup server is not serving database request but keeps track of all changes made updating its own database. It is activated in case the main system fails. See this diagram for an example.



High Availability configuration (Example)

5.6 Service Availability

General downtime for service and Maintenance:

To be planned once per year

Friday Evening 00:00 until Saturday 04:00.

5.7 Log Files

Logs are written by ORACLE database, Web server, FaMe Interfaces and monitoring, for instance Nagios.

6. Security

6.1 LDAP

6.1.1 Authentication

Windows native identification is available (SSO, single sign-non) via IIS.

6.1.2 Authorization

Available via LDAP and FaMe User Management

6.2 Port List

TCP port	80 or 443	(HTTP, HTTPS) Webserver
	8080	IoT Broker (default: 8080, may be changed)
	1521	Database (default value, may be changed, no access from clients)

7. Software Distribution

FaMe provides software distribution through Gitlab or download from FaMe download site.

Development Server: on FaMe premises

SIT and UAT Server: operated by customer; optionally set up by FaMe through remote Access

Production Server: operated by customer, no external access