# 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

# **FaMe Facility Management one Stop Solution for Smart Buildings**

FaMe Solution 1 Building Management Request	Creates sustainable Solution for the  Cre ext	Me Solution 3 eates internal and ernal Workorders execution	FaMe Solution 4 KPI, SLA, Survey approval and rating Executed solution
Via App, Desktop, IoT Asset Management Request  Planned Maintenance Corrective Maintenance Condition Maintenance Predective Maintenance Infrastructure Mangement Request Space Management Meeting Management Workplace Management Cleaning Management Smart Building Sensor condition report IoT Integration condition report Occupation Report	FaMe Wizards, Supervisor  Asset Management  Asset register and tracking  Warranty Management  Spare Part Warehouse Management  Enviromental pollution guidelines Infrastructure Management, Reduce space was  Share Workplaces, Energy savings  Share Conference room, Energy savings  Reduce Cleaning supplies consumption Smart Building  Operate BMS System. Reduce Energy  IoT Light Management. Reduce Energy  Cooling and Heating. Reduce Energy	Environment     Ticket parameter	Quality Insurance  KPI Calculation  SLA Calculation  Survey Reports  Survey App IoT Sensors  Check result (new readings)

## 1.1 Purpose

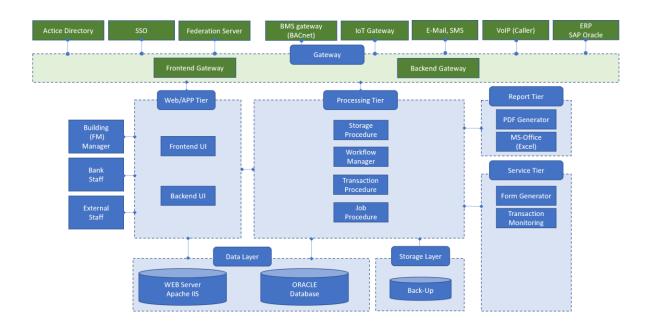
This documentation outlines the technical details of the FaMe CAFM Solution with Smart Building extension.

## 1.2 Scope

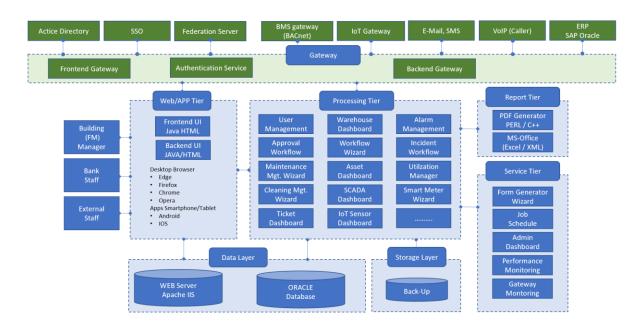
This documentation explains the technical aspects related to the FaMe Facility Management (CAFM) System and the FaMe Smart Building Solution.

## 2. Architecture

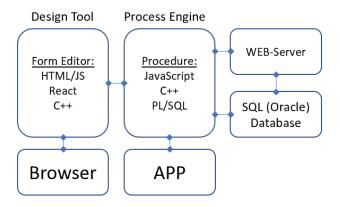
## 2.1 System Architecture



#### 2.2 Micro Service Architecture

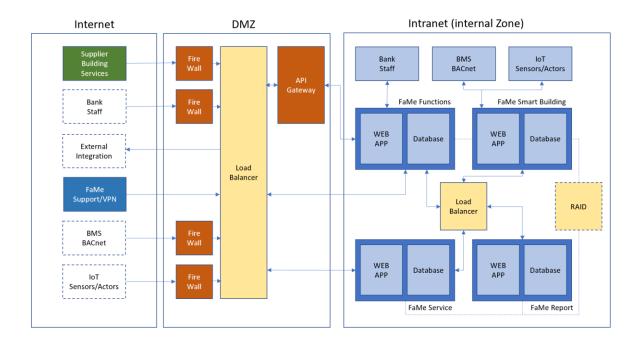


## 2.3 Customizing Environment



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

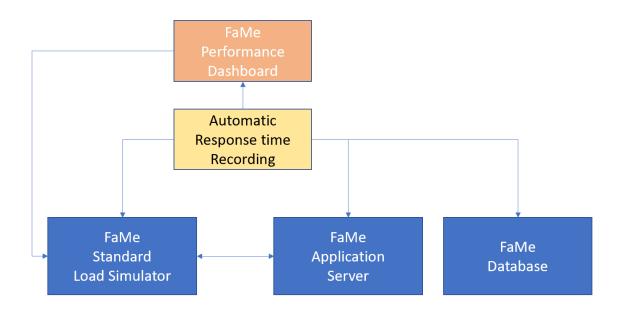
Module	Count	Core	RAM (GB)	Storage (GB)
Ticket System Desktop WEB/APP	1	4C	32	20
Ticket System APP	1	4C	32	20
Ticket System DB	1	4C	32	20
Maintenance Desktop WEB/APP	1	4C	32	20
Maintenance System APP	1	4C	4	20
Maintenance System DB	1	4C	32	20
Cleaning/SoftService Desktop WEB/APP	1	4C	32	20
Cleaning/SoftService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

			RAM	Storage		
	Quantity	Core	(GB)	(GB)	Description	OS
Application and					WEB Server IIS,	Windows 2016/19/22/
WEB Server	1	4C	16	500	Apache	RedHat 7/8, Oracle Linux
Database Server						Windows 2016/19/22/
(ORACLE)	1	4C	32	1000	Data Server	RedHat 7/8, Oracle Linux
Report Server						Windows 2016/19/22/
(PDF)	1	4C	16	100	Report (PERL)	RedHat 7/8, Oracle Linux
						Windows 2016/19/22/
IoT Broker	1	4C	16	100	IoT Interface	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
	IIS (MS Internet Information			8.5 and 10
1	Server)	Web	Microsoft	6.5 and 10
	Oracle Enterprise Standard			19C
2	Edition	Database	Oracle	190
3	PDF Writer	Web	FaMe	2.4
4	PDFlib library	PDF	PDFlib.com	10.0
				5.28, 5.30,
5	Perl Interpreter	PDF	Open Source	or 5.32
6	Tomcat server	IoT	Open Source	8.5 - 10
				2016, 2019,
7	Windows Server	OS	Microsoft	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

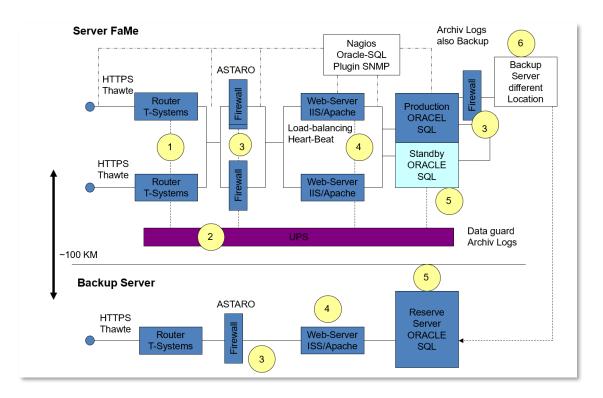
		Stand Alone	Redundant
System	Criticality	Configuration	Configuration
Database	High	60 min	zero
Web Server	High	60 Min	zero
Application			
Server	High	60 min	zero
Report Server	Medium	120 min	zero
E-Mail Interface	High	60 Min	zero
IoT Interface	High	10 Min	zero
BACnet			
Interface	High	10 Min	zero

## 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)

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