Technology in bonÀrea (Past and Present)

bonÀrea | IT

THE FUTURE IS ALREADY HERE

By Sergi Trujillo

it.bonarea.com

WHO I AM?

SERGI TRUJILLO

Born in Tarragona in 1980

My first program in 1991 in Basic on a Philips VG 8020 MSX.

IT technical engineer in management, URV, 2007,
Master degree in Computer Engineering, UdL 2022,

Many courses, seminars, books, documentation, hours of youtube, stackoverflow, etc. *We must never stop wanting to learn.*

Working in IT Since 1998, in bonÀrea since 2013. Currently, Software infrastructure manager.

Passionate about how things are done and how it works.

Hobbies: Mountain Bike and Casteller.

ÍNDEX

1. General introduction

COMMERCIALIZATION – **ESTABLISHMENTS**

CASH & CARRY: is the specialized sale for professionals. We currently have 15 points of sale where they offer a wide range of food and non-food products and are aimed exclusively at meeting the needs of Wholesalers, Horeca (Food Servie) and Retailers.

Other establishments :

- Shops
- Buffets - restaurants
- Gas stations
- Agro-centers

ACTIVITIES – **ANIMAL FEEDING**

bonÀrea Mascota goes further with animal food. With its Slow Pet Food philosophy, it starts in the countryside making the recipes with fresh, local, natural ingredients cooked in steam.

ACTIVITIES – AGRICULTURAL SERVICES

These companies that form these services have everything related to the field. From veterinarians specializing in all animal species, in agricultural advice, fertilizers and nuts.

- Animal and plants health
- Agricultural management
- Seeds and Fertilizers
- Nuts

CLOSED **CIRCLE**

bonÀrea Agrupa – Agri-food sector

- From 1959.
- Extensive experience in the sector. It develops all **livestock, industrial and commercial** activities without intermediaries.
- Realization of the **complete production cycle**. It currently holds all processes:
    - Birth of birds and livestock
    - Feed manufacturing
    - Breed and fatten
    - Sacrifice and transformation of the production of products
    - Sales

ACTIVITIES - **ENERGY**

Company of the group that brings together three micro-companies of Fuel, Electricity and Gas.

Fuels

Energy

Gas

ACTIVITIES - SERVICES

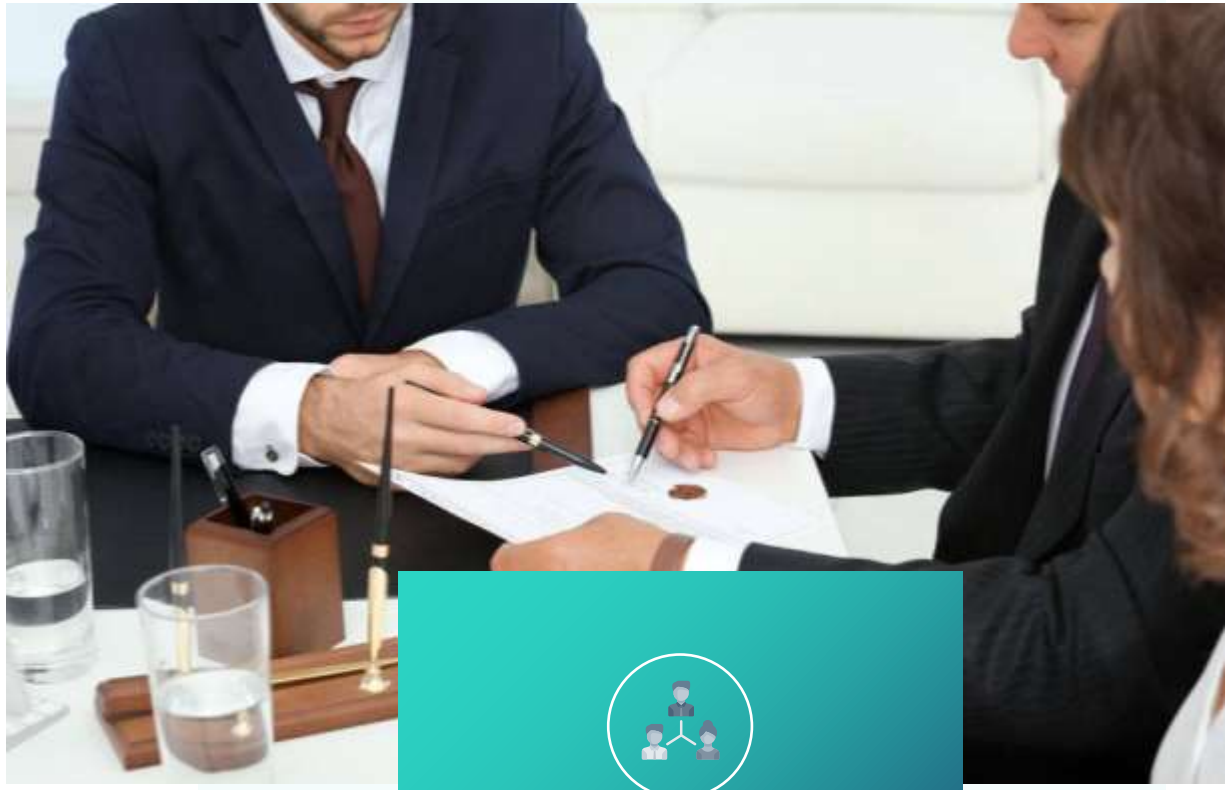
Legal, financial, advisory and communications services offered by bonÀrea.

01. Finances: Caixa Guissona

02. Insurances: bonÀrea Assegura

03. Consultant: bonÀrea Assessora

04. Communications: bonÀrea Telecom



Vocation of service

Offer good services at a good price to our customers and partners.

SOCIAL ACTION - **FOUNDATIONS**

+ bonÀrea Foundation Assistance

Private non-profit entity whose main purpose is to offer socio-health and residential care to the elderly, promote and facilitate medical assistance, together with disease prevention

+ bonÀrea Foundation Sport

Private non-profit entity, promotes sports and leisure activities to energize our rural environment and promotes a healthy lifestyle.

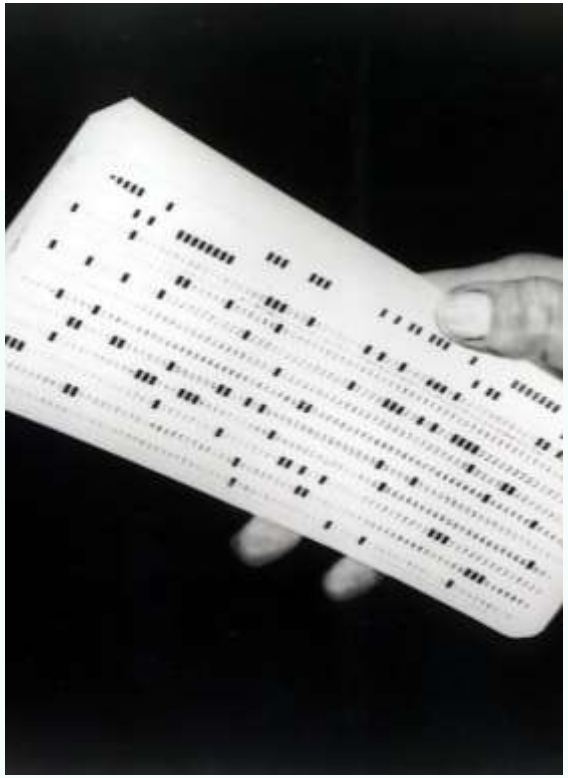
MORE INFORMATION

www.bonarea-agrupa.com

2. bonÀrea IT history

COMPUTER TIME RENTAL IN **BARCELONA**

From 1965 to 1970 the first IBM computer arrived.



Formulation of Feeds

Exact components that each species needed for its feed. Linear programming.

Computer in Barcelona

FIRST AND SECOND **COMPUTER**

After a few years of going to Barcelona with punched cards, we incorporated the first computers into the company. Therefore, we can say that bonÀrea IT started then.

| IBM 36020

First computer that entered our offices in 1969. It allowed us to start digitizing our programming and accounting

| IBM 37020

10 years later, we acquired a more complex computer that allowed us to keep moving forward.

FIRST PROMOTERS AND **ENCODERS**

The first task performed by both developers and coders was the digitization of the most cumbersome administrative tasks of the time. Therefore, we can say that many of the first computer scientists were administrative.

First Aspects

Administrative training so that their jobs could be automated

Pick Systems

It was the first system that was worked with. One of the particularities it had was that it allowed the instructions to be transformed into Spanish.

Ex: SELECC FICHERO CON C1='VALOR' POR C2

FROM IT TO **BUSSINES AREAS**

From the 90s, all IT began to be transferred to the business areas.

Direct sales to the consumer without any intermediary.

Curiosities:

- 1995 – 30 stores in the “Area de Guissona” franchise are reached
- 1996 – Inauguration of "Promotional Area" in Guissona, with sales of PLS products and food, buffet restaurant and fuel service station.

DEPARTAMENTAL **SYSTEM**

Organization of The company

- ✓ bonÀrea currently has more than 25 departments. Each with its own internal structure and IT team.
- ✓ Each department has a hierarchical order that gives rise to the level of responsibility of each worker.
- ✓ Organization, teamwork, communication (both internal and external) and the organization of information are very important aspects.

+25 | Departments

The departments are divided into different areas according to the business areas that each deals with. Within each department there are more specific sections.

CREATION OF THE **CENTRAL DEPARTMENT**

2016 – Creation of Direcció General

This department aims to unify technology criteria and offer solutions that are implemented at the global level in bonÀrea Group. It currently has more than 30 members divided into different areas

- Systems
- App Development
- Big Data
- ERP Solutions
- Artificial Intelligence
- Cyber security

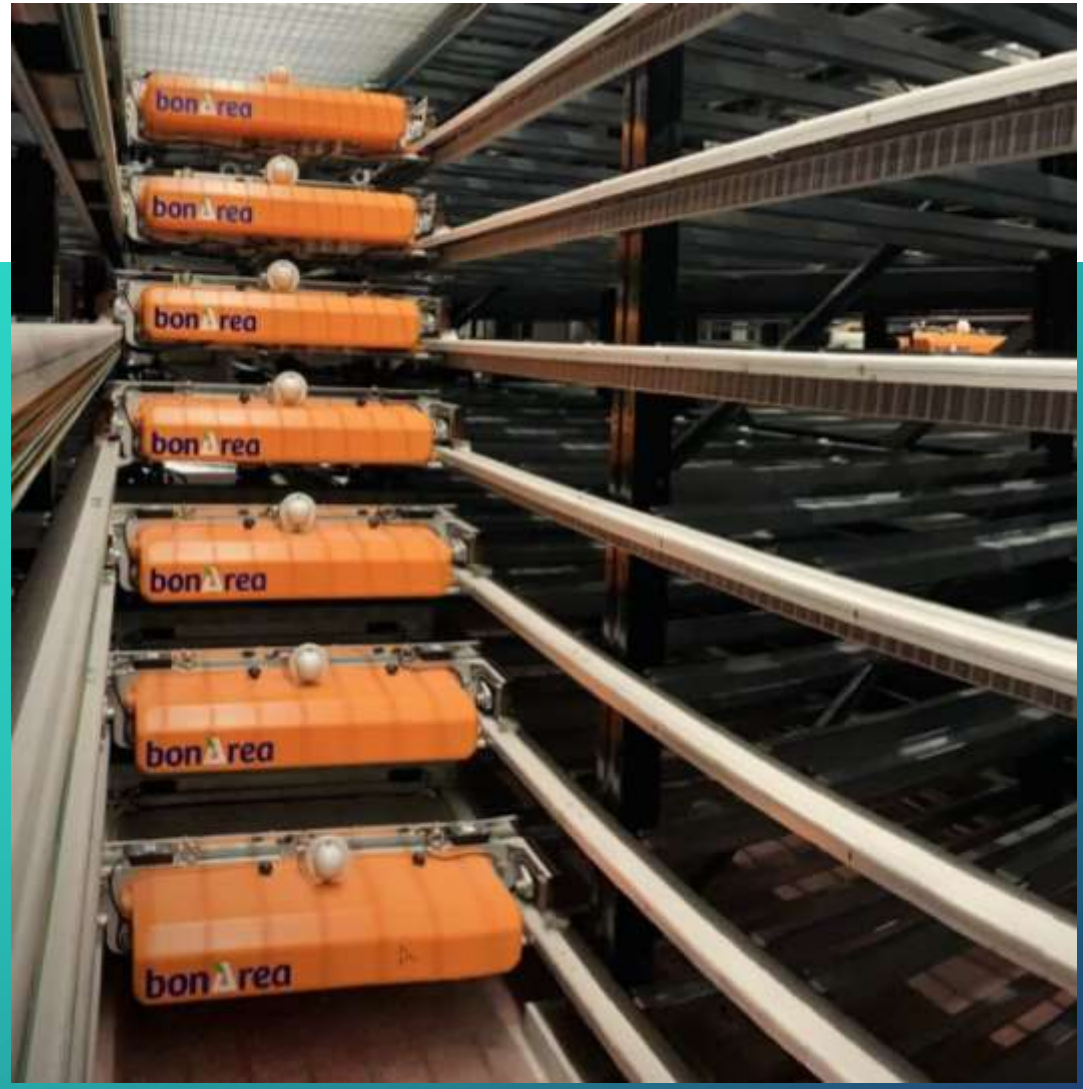
3. bonÀrea IT

bonÀrea | IT

The future is already here

At bonÀrea IT we want to enhance all the talent of each of our employees and that is why we work not only to promote the growth of the company but also to promote their professional career by offering all kinds of training in their field of work.

Know About Us → It.bonarea.com



NUMBER OF PROFESSIONALS IN BONÀREA IT

bonÀrea Agrupa has always opted for technology and has tried to keep it present throughout the production cycle. Starting with the digitization of the primary sector, passing through industrial activities and finally with the distribution of products.

+200 PROFESSIONALS

8 TECHNOLOGICAL AREAS

CONTINUOUS TRAINING

THE VALUE OF KEEP KNLOWLEDGE

Being away has given us the knowledge and skills to fully manage ourselves.

From this situation we have a strong conviction to develop our own technological solutions.

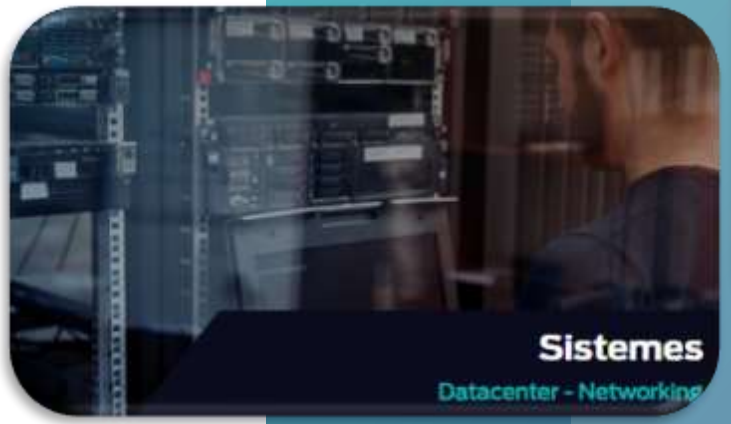
Today we continue betting on our talent.

During the 70's:

Go from Guissona to Barcelona by car more than 2 hours.

Go from Guissona to Lleida by car more than 1 hour.

TECHNOLOGICAL AREAS



KNOW **BONÀREA IT**

Visit our website

There you will find all the necessary information about what bonÀrea IT is, and how we work.

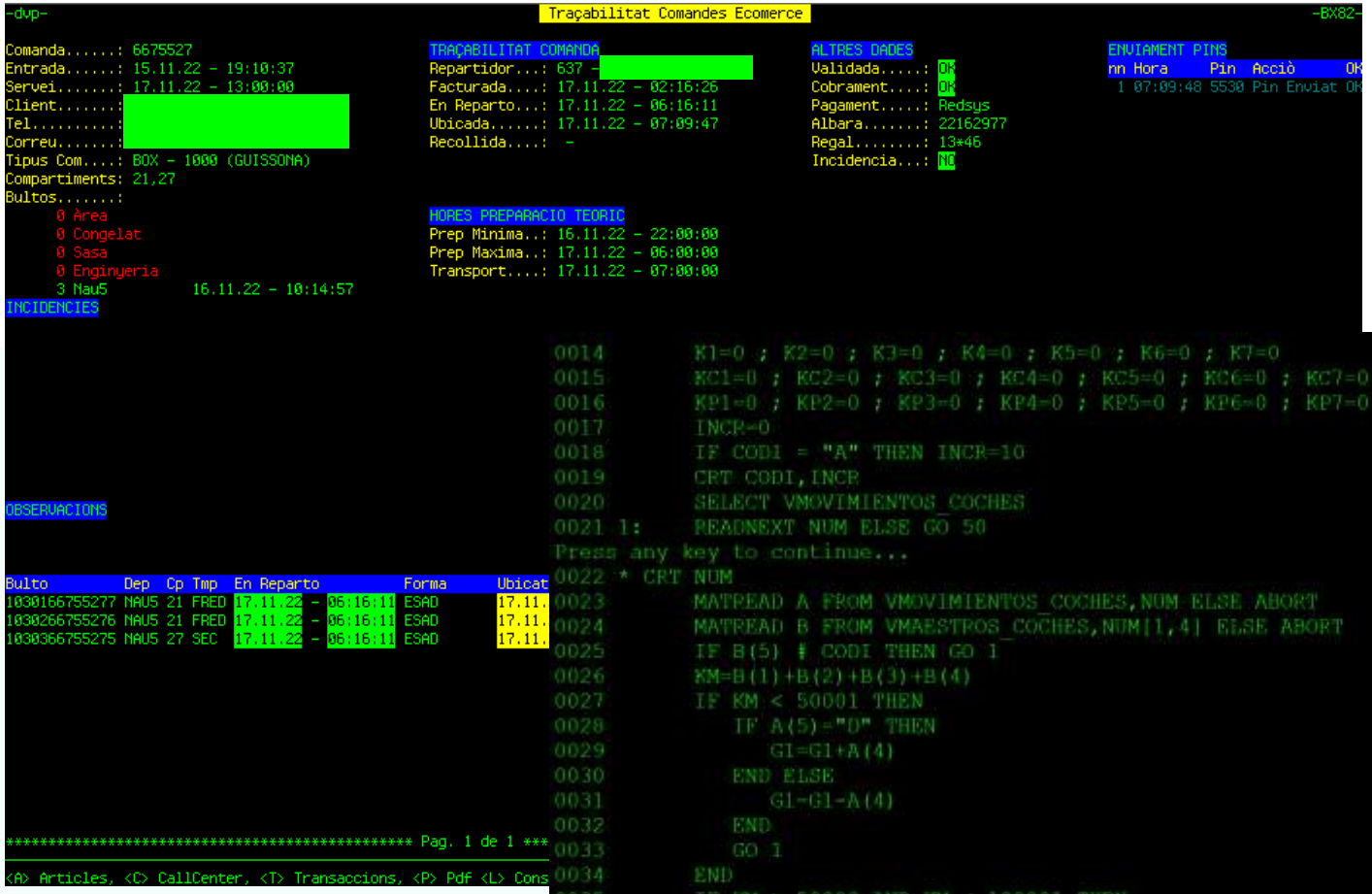
it.bonarea.com

Video

All the IT departments participated in this video to give an insight into what our day-to-day life is like.

4. Languages/Frameworks

UNIBASIC

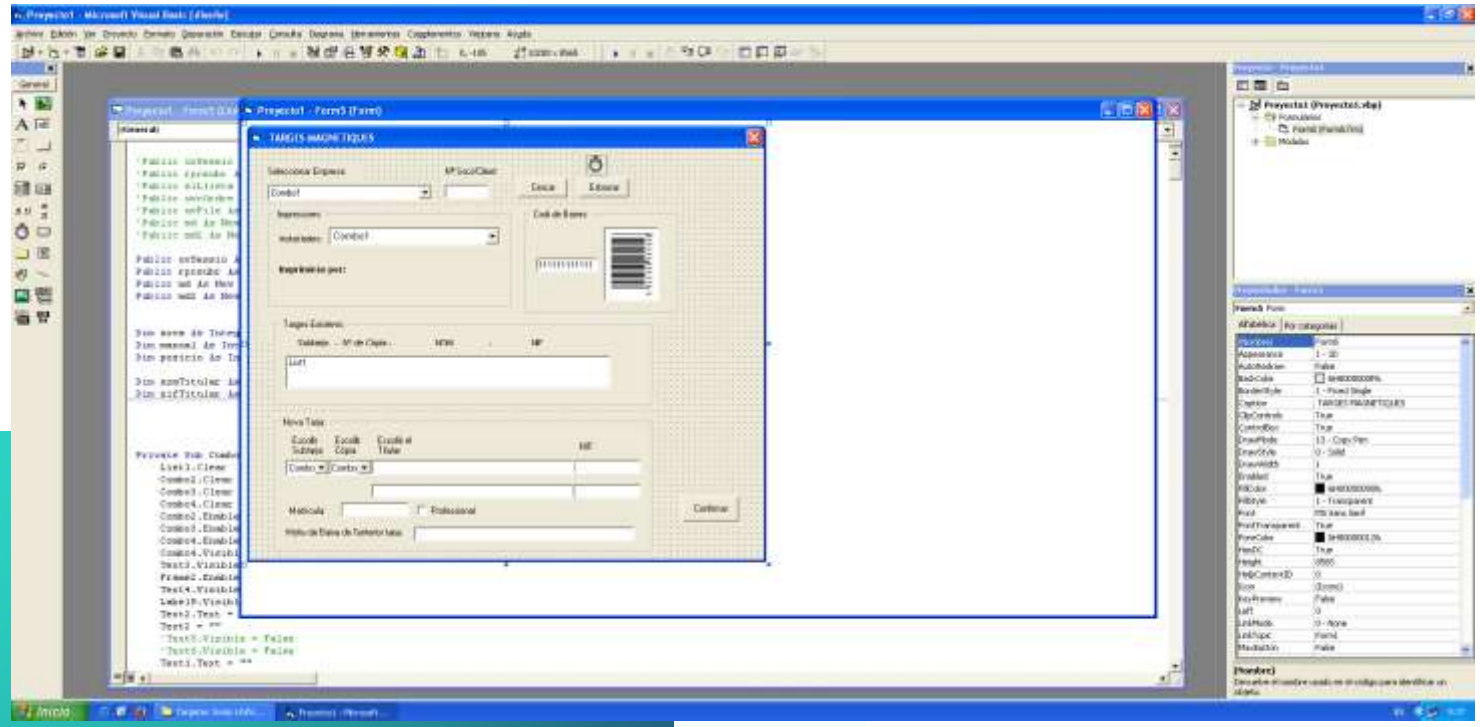



```
0014        K1=0 ; K2=0 ; K3=0 ; K4=0 ; K5=0 ; K6=0 ; K7=0
0015        KC1=0 ; KC2=0 ; KC3=0 ; KC4=0 ; KC5=0 ; KC6=0 ; KC7=0
0016        KP1=0 ; KP2=0 ; KP3=0 ; KP4=0 ; KP5=0 ; KP6=0 ; KP7=0
0017        INCR=0
0018        IF CODI = "A" THEN INCR=10
0019        CRT CODI,INCR
0020        SELECT VMOVIMIENTOS_COCHES
0021 1:     READNEXT NUM ELSE GO 50
Press any key to continue...
0022 * CRT NUM
0023        MATREAD A FROM VMOVIMIENTOS_COCHES,NUM ELSE ABORT
0024        MATREAD B FROM VMAESTROS_COCHES,NUM[1,4] ELSE ABORT
0025        IF B(5) # CODI THEN GO 1
0026        KM=B(1)+B(2)+B(3)+B(4)
0027        IF KM < 50001 THEN
0028           IF A(5)="D" THEN
0029              G1=G1+A(4)
0030           END ELSE
0031              G1=G1-A(4)
0032           END
0033           GO 1
0034        END
0035        IF KM > 50000 AND KM < 100001 THEN
0036           IF A(5)="D" THEN
```

\+ Only a Terminal Client installed on client.
\+ Fast
\+ Long Term

\- Use as many licenses as open terminals
\- Few connectors

VISUAL **BASIC**



- Obsolete.
- Need to install libraries and software on client.
- Use as many licenses as open terminals

+ Interaction with O.S. and devices.

```php
<!DOCTYPE html>
<html>

<head>
    <style>
        h1 {
            color: green;
        }
    </style>
</head>

<body>
    <center>
        <h1>Welcome To GFG</h1>

        <h2>
            <?php
            echo "This is PHP code inside html"
            ?>
        </h2>
    </center>
</body>

</html>
```

```asp
<!DOCTYPE html>
<html>
<body>
<%
response.write("My first ASP script!")
%>
</body>
</html>
```

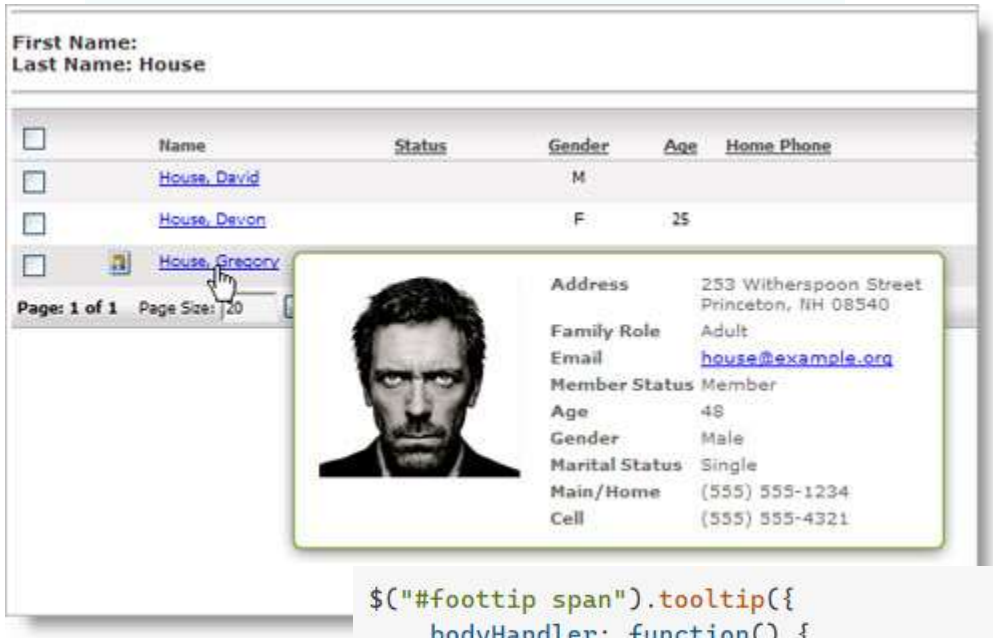
ASP/PHP

- Each request open and close independent connection to database
- Full page is sent on each query

+ Easy

Use browser as Terminal.
+ Security
+ Not necessary install software (usually browsers are present on computers)

- Hard to control external components or devices
- Differences between browsers

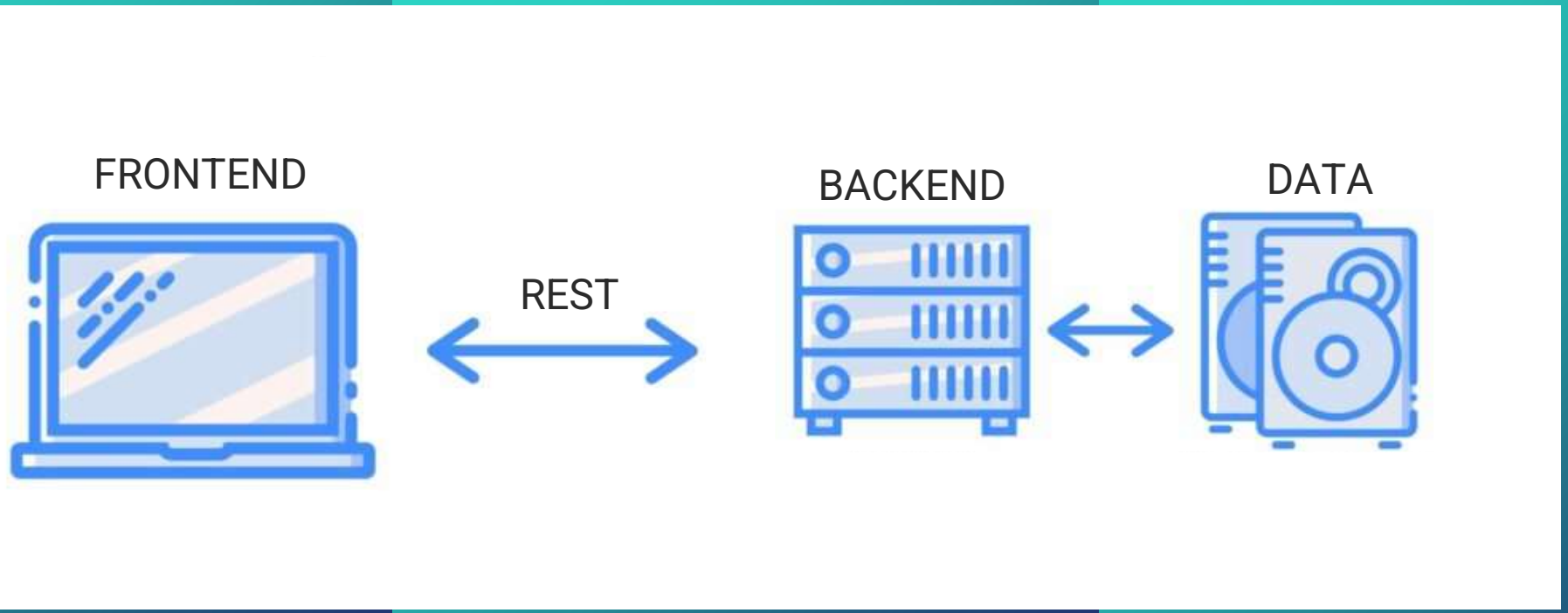



```
$("#foottip span").tooltip({
    bodyHandler: function() {
        var url = $(this).attr("href");
        var tip = $("<span/>").html("loading tip...");

        $.ajax({
            url: url,
            success: function(html){ tip.html(html); }
        });

        return tip;
    },
    showURL: false
});
```

WEB 2.0
JQUERY/BOOTSTRAP

With the advent of Web 2.0, JQuery was one of the most widely used libraries to facilitate DOM management and make AJAX calls.

DATA, BACKEND **AND FRONTEND**



WEB COMPONENT
POLYMER

```
<dom-module id="x-custom">
  <template>
    <button on-tap="handleTap">Kick Me</button>
  </template>
  <script>
    Polymer({
      is: 'x-custom',
      handleTap: function() {
        alert('Ow!');
      }
    });
  </script>
</dom-module>
```

Sender:

```
this.fire('iron-signal', {name:
'hello', data: null});
```

Listener:

```
<iron-signals
on-iron-signal-hello="onHello">
</iron-signals>
```

```
<dom-module id="x-custom">
  <template>
    <div>I will respond</div>
    <div>to a tap on</div>
    <div>any of my children!</div>
    <div id="special">I am special!</div>
  </template>

  <script>
    Polymer({

      is: 'x-custom',

      listeners: {
        'tap': 'regularTap',
        'special.tap': 'specialTap'
      },

      regularTap: function(e) {
        alert("Thank you for tapping");
      },

      specialTap: function(e) {
        alert("It was special tapping");
      }

    });
  </script>
</dom-module>
```

- Web Components library
- Polimer became obsolete
- We use Polyfil in typeScript

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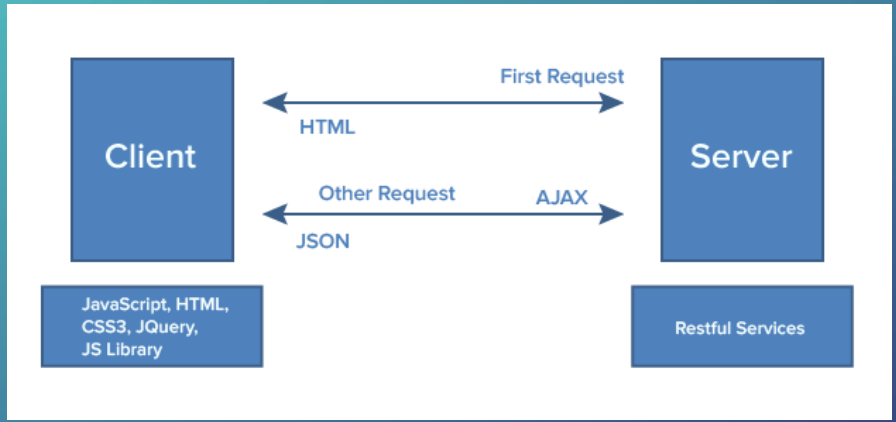
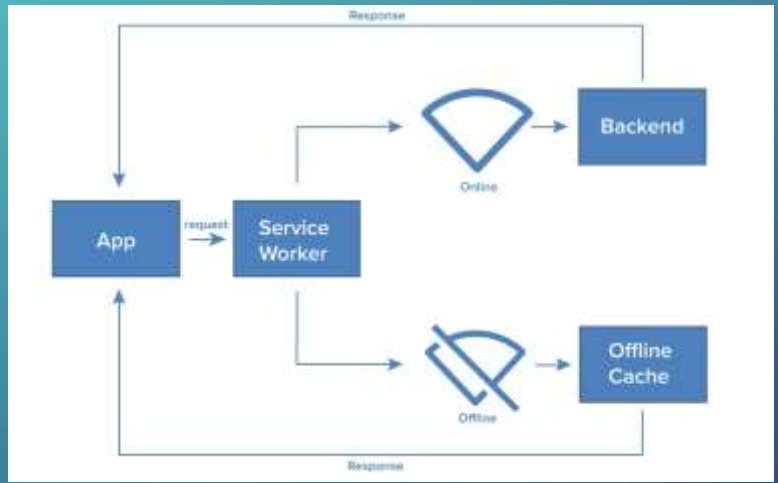
SPA/PWA

- Polymer - Angular - TypeScript

SPA (Single Page Application)



PWA (Progressive Web App)



JAVA

JAVA EE

OpenJDK

OpenJDK

Developer(s)	Oracle, OpenJDK and Java Community, Red Hat, Azul Systems, IBM, Microsoft, Amazon, Apple, SAP

Build	Organization
AdoptOpenJDK[25] (moved to Eclipse Temurin at Adoptium in 2021)[26]	
Alibaba Dragonwell[27]	Alibaba
Amazon Corretto[28]	Amazon
Azul Zulu[30]	Azul Systems
BellSoft Liberica JDK[31]	BellSoft
Eclipse Temurin[32]	Adoptium
IBM Java SDK[33] (moved to IBM Semeru Runtime Certified Edition at version 11)	IBM
IBM Semeru Runtime Certified Edition[34]	IBM
IBM Semeru Runtime Open Edition[36]	IBM
JetBrains Runtime[37]	JetBrains
Microsoft Build of OpenJDK[38]	Microsoft
ojdkbuild[39]	
OpenLogic OpenJDK[40]	OpenLogic
GraalVM Community Edition[41]	GraalVM
Oracle GraalVM Enterprise Edition[42]	Oracle
Oracle Java SE[43]	Oracle
Oracle OpenJDK[44]	Oracle
Red Hat build of OpenJDK[49]	Red Hat
SAP SapMachine[50]	SAP
Tencent KonaJDK	Tencent

SOURCE: WIKIPEDIA

Java EE

eclipse

Java EE 7

JAKARTA EE

The best backward compatibility, so far, has been achieved using Java technology.

Migration

Import javax.* To Import jakarta.*

ONE SPACIFICATION MULTIPLE **IMPLEMENTATIONS**

GlassFish

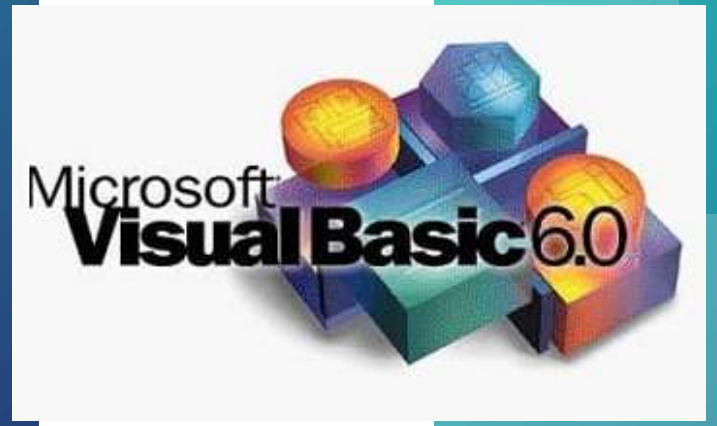
Open Liberty

SPECIFICATIONS

JAKARTA EE

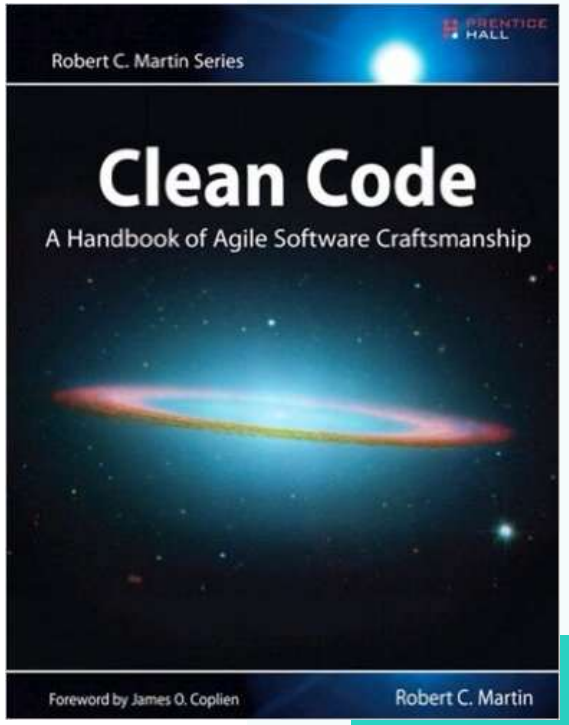
MICROPROFILE

- Open Tracing 3.0
- Open API 3.0
- Rest Client 3.0
- Config 3.0
- Fault Tolerance 4.0
- Metrics 4.0
- JWT Propagation 2.0
- Health 4.0
- CDI 3.0
- JSON-P 2.0
- JAX-RS 3.0
- JSON-B 2.0
- Jakarta Annotation 2.0



CHOOSING GOOD TECHNOLOGIES **IS NOT EASY**

A version change can trigger a lot of work. The loss of continuity of some languages or frameworks force to redo entire projects.



GOOD **PRACTICES**

Single-responsibility principle
Open–closed principle
Liskov substitution principle
Interface segregation principle
Dependency inversion principle

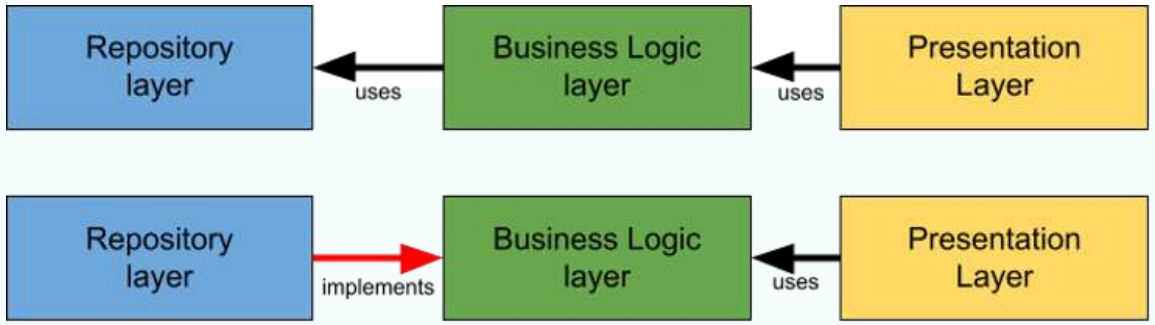
Use of patterns

KISS (Keep it simple, stupid)
DRY (Don’t repeat yourself)
YAGNI (You Aren't Gonna Need It)
Don't reinvent the Wheel

Always use a Software Versioning System as Git

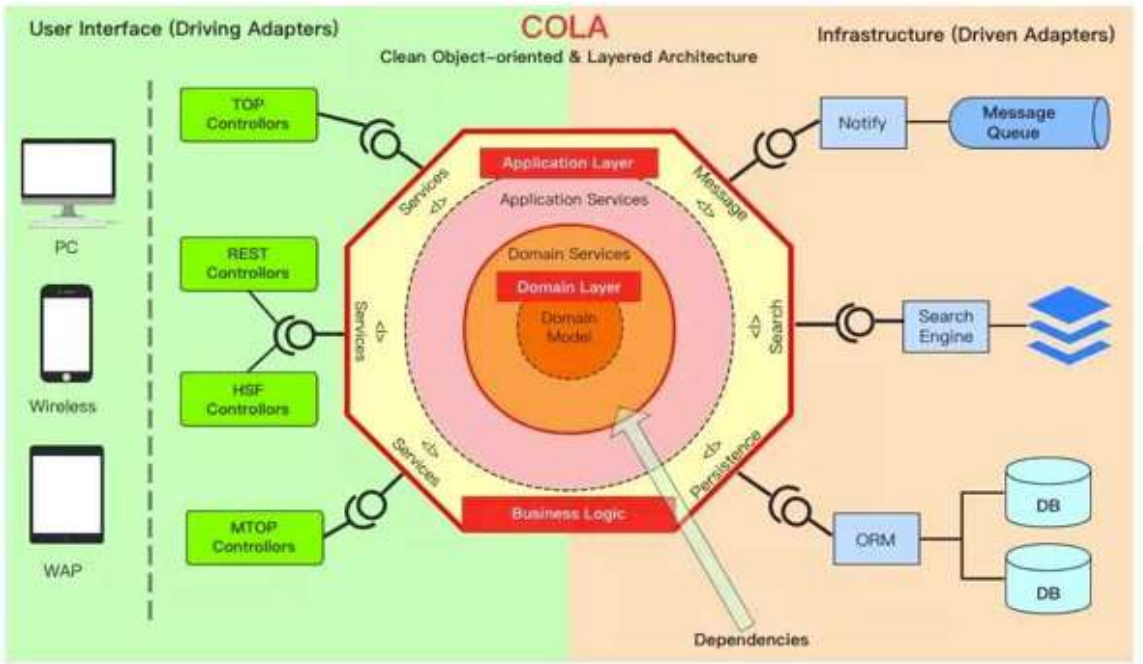
DOMAIN DRIVEN **DESING**

The important thing is the business, not the data that is stored



Very simplified difference of typical design vs DDD

HEXAGONAL **ARCHITECTURE**



PROGRAMMING VULNERABILITIES

Software vulnerabilities are weaknesses or flaws present in your code.

- XSS
- CSRF
- SQL Injection
- Exploit

Common Vulnerabilities and Exposures

The mission of the CVE is to identify, define, and catalog publicly disclosed cybersecurity vulnerabilities

Programming safely, give confidence to the company and users

!!

owasp.org
attack.mitre.org

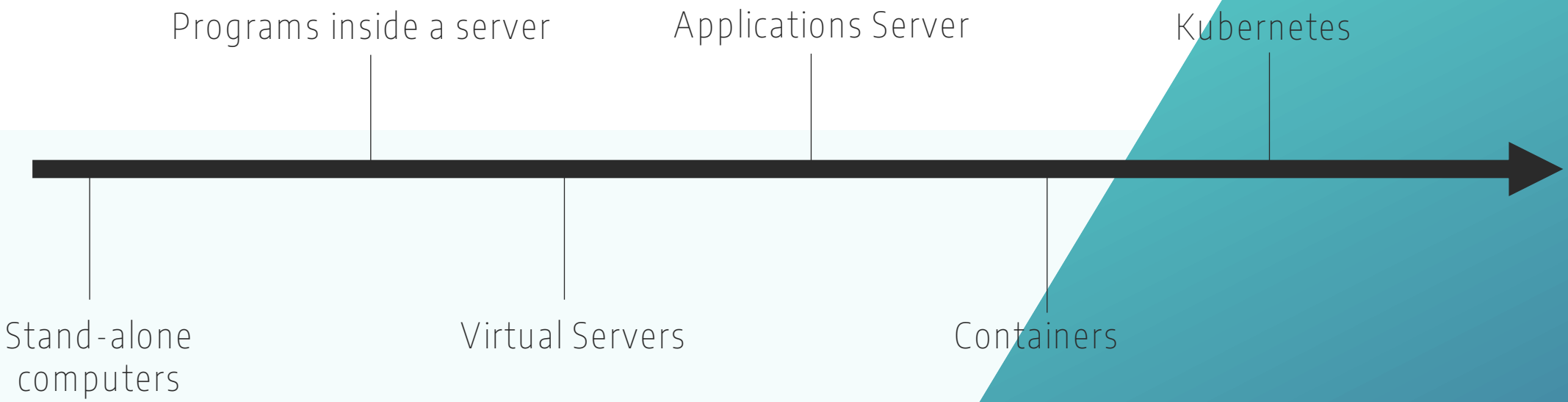
TRAINING AND **AWARENESS**

The maximum degree of security of a system is marked by the strength of its weakest link, which is usually the USER

- Training for developers
  - OWASP TOP 10
  - SECURE PROGRAMMING
- Training for desktop users
  - Basic cyber security

5. Infrastructure

TIMELINE OF **INFRASTRUCTURE**



VIRTUAL **SERVERS**

- +500 Virtual Machines
- +1 petabyte of storage
- +8 TB RAM
- +1 petahers of Processing power

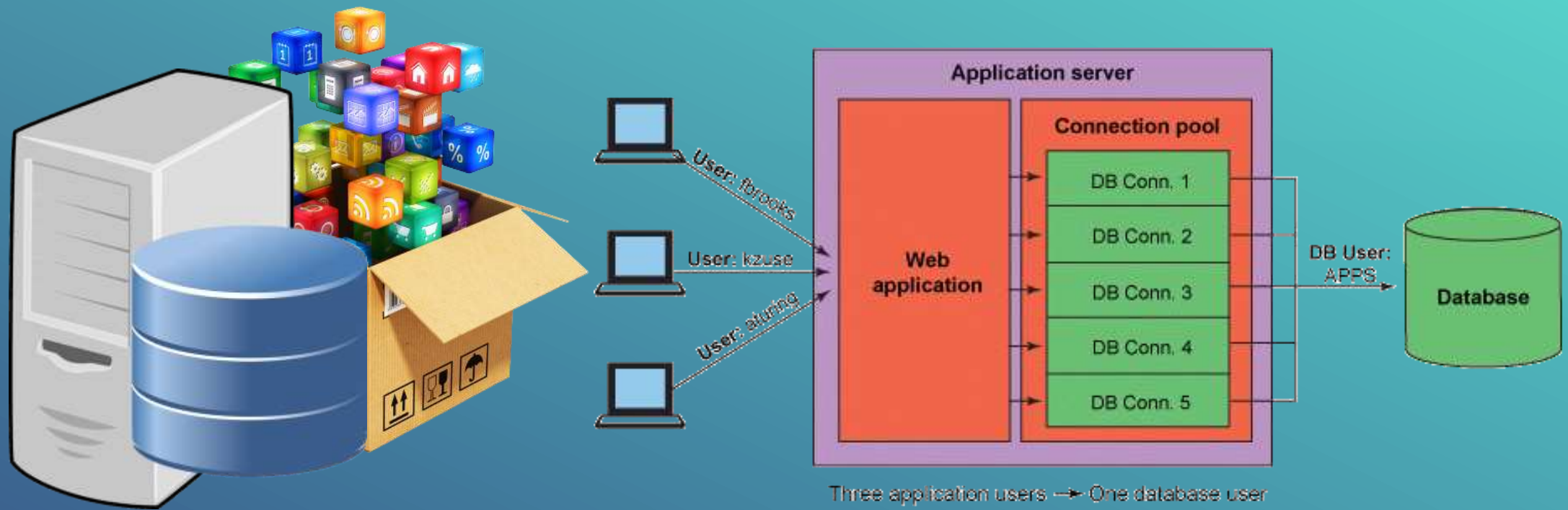
More than 15 years ago, bonÀrea opted for server virtualization.

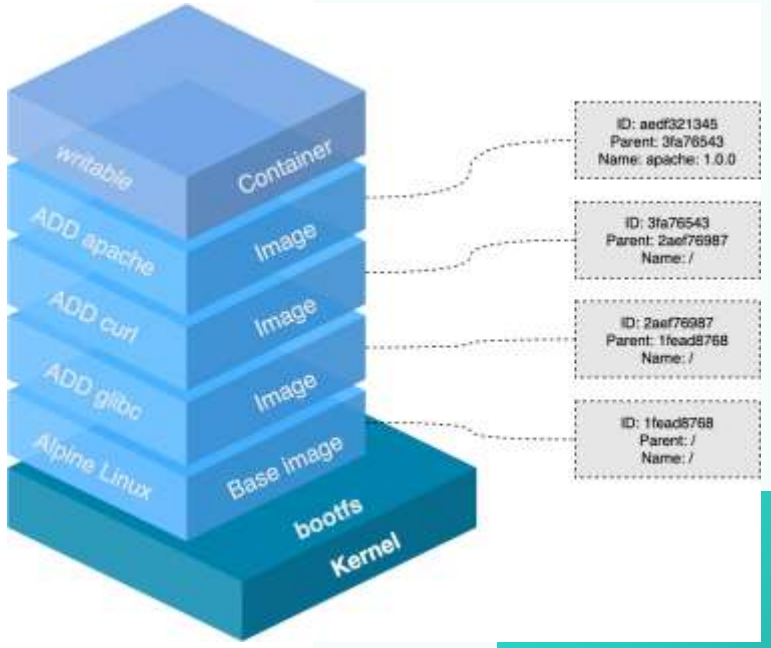
Virtualization brings:

- Cost reduction
- Scalability
- Personalization
- Simple maintenance
- Easy data recovery

APPLICATIONS SERVER

Applications Server





CONTAINERS

```
# Source: https://github.com/payara/docker-payaramicro/blob/master/Dockerfile

FROM azul/zulu-openjdk-alpine:8u222-jre

# Default payara ports to expose
EXPOSE 6900 8080

# Configure environment variables
ENV PAYARA_HOME=/opt/payara\
   DEPLOY_DIR=/opt/payara/deployments

# Create and set the Payara user and working directory owned by the new user
RUN addgroup payara && \
   adduser -D -h ${PAYARA_HOME} -H -s /bin/bash payara -G payara && \
   echo payara:payara | chpasswd && \
   mkdir -p ${DEPLOY_DIR} && \
   chown -R payara:payara ${PAYARA_HOME}
USER payara
WORKDIR ${PAYARA_HOME}

# Default command to run
ENTRYPOINT ["java", "-XX:+UseContainerSupport", "-XX:MaxRAMPercentage=90.0", "-jar", "payara-micro.jar"]
CMD ["--deploymentDir", "/opt/payara/deployments"]

# Download specific
ARG PAYARA_VERSION="5.201"
ENV PAYARA_VERSION="$PAYARA_VERSION"
RUN wget --no-verbose -O ${PAYARA_HOME}/payara-micro.jar https://repo1.maven.org/maven2/fish/payara/extras/payara-micro/${PAYARA_VERSION}/payara-micro-${PAYARA_VERSION}.jar
```

KUBERNETES

deployment.yml

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx:1.7.9
        ports:
        - containerPort: 80
```

$ kubectl apply -f deployment.yml

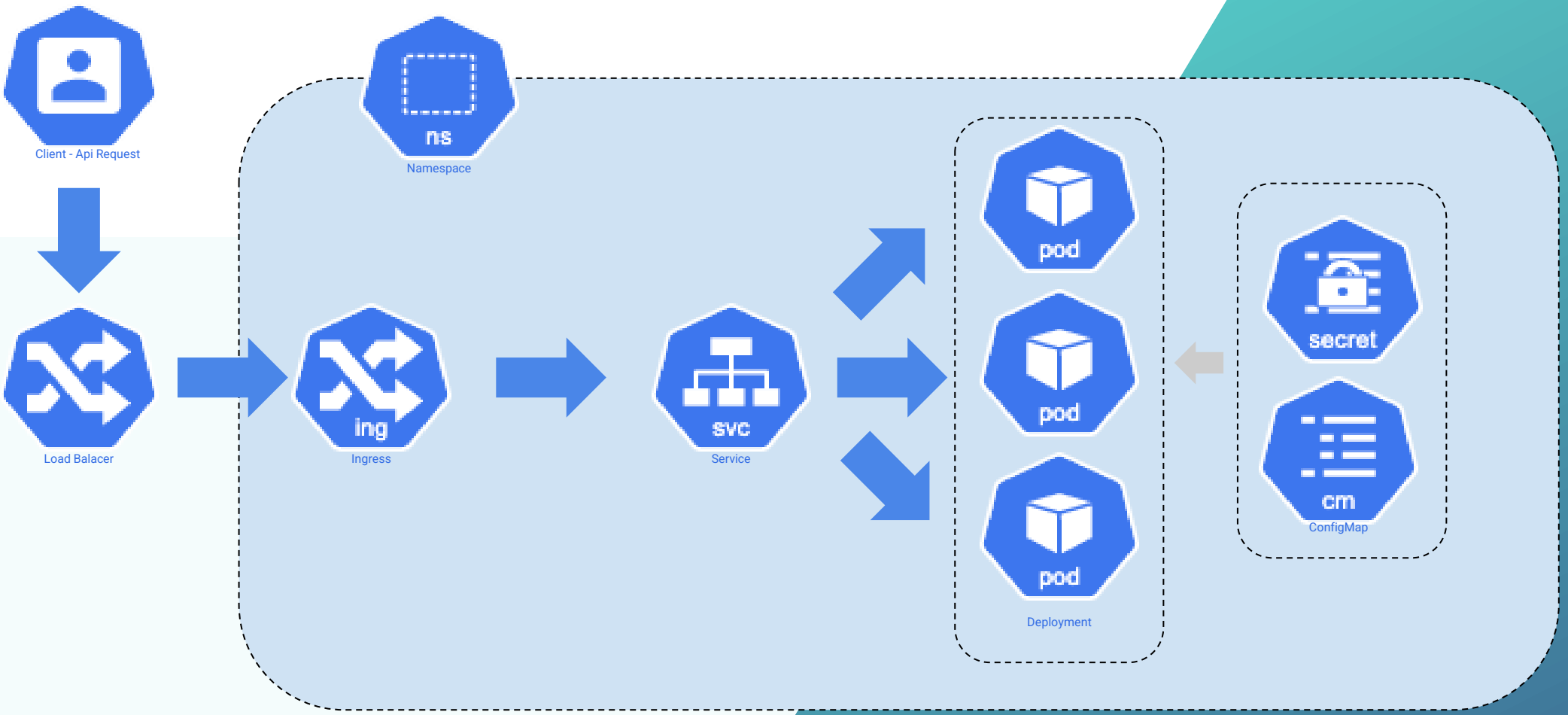
RANCHER

OPENSHIFT

VMware Tanzu

CLOUD NATIVE COMPUTING FOUNDATION

KUBERNETES


Client - Api Request
ns
Namespace
Load Balacer
ing
Ingress
svc
Service
pod
pod
pod
Deployment
secret
cm
ConfigMap

ON PREMISE VS CLOUD

On premise

Control

- ✓ Data Protection
- ✓ Unrestricted access
- ✓ Own maintenance

Physical access to information

Cloud

Scalability

- ✓ No hardware
- ✓ Managed maintenance
- ✓ Costs per use

Access anywhere

3 DATA CENTERS **A BONÀREA**

Oficines centrals

It is the company's main data center

La Closa

Data center more oriented to the industrial environment

Enginyeria

Back-up data center that can assume the burden of either of the two previous ones

bonÀrea IT

6. Network and communications

EVOLUTION OF **DATA MANAGEMENT**

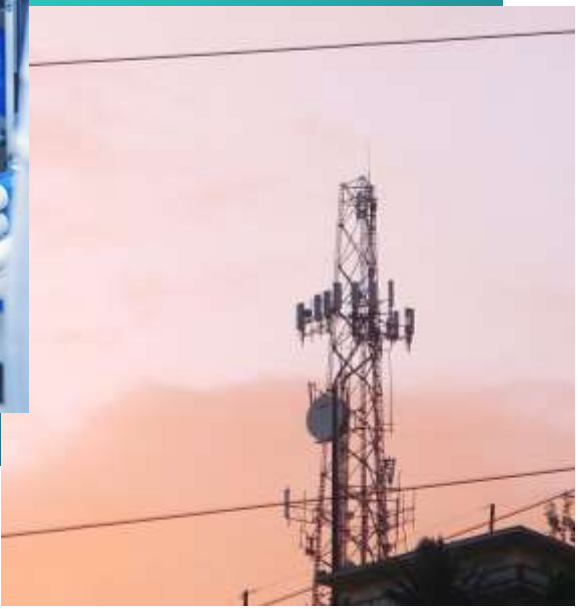
The data is collected physically at gas stations.

Data is received via the internet only at night

The data is obtained through a telephone line

Data is received real time.

COMMUNICATIONS WITHIN THE **COMPANY**



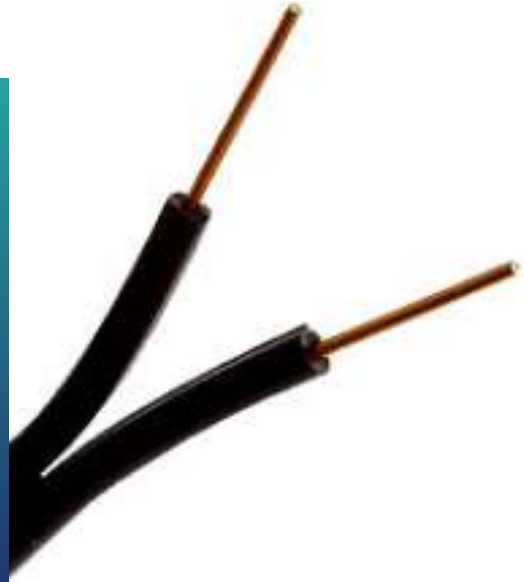
Rs232 → Coaxial → RJ45 → Fiber

In the beginning there was no terminal and therefore it was done in a single central server. With the appearance of personal computers these could be interconnected.

The first network was of the coaxial type and later it was switched to copper (RJ45) and later to fiber and wireless. Making every element interconnected.

Technology

bonÀrea is currently renewing the communications ring with a fiber speed of 40 gb/s x2



COMMUNICATIONS WITHIN THE **COMPANY**

Vlan → Vxlan SDN

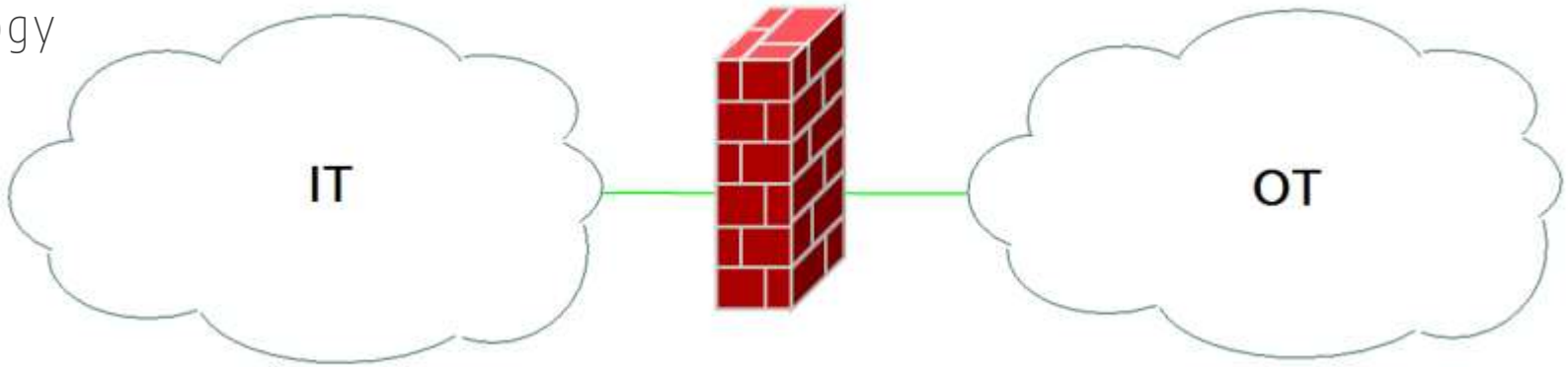
Approximately 10,000 network ports are being managed, on about 150 subnets. The management of the entire system requires the control and monitoring of all resources in a very fine way.

SEPARATION ENVIRONMENTS **IT/OT**

The two worlds must interact in a safe way, a compromise in one of the two areas could affect the other.

IT: Information technology

OT: Operation technology

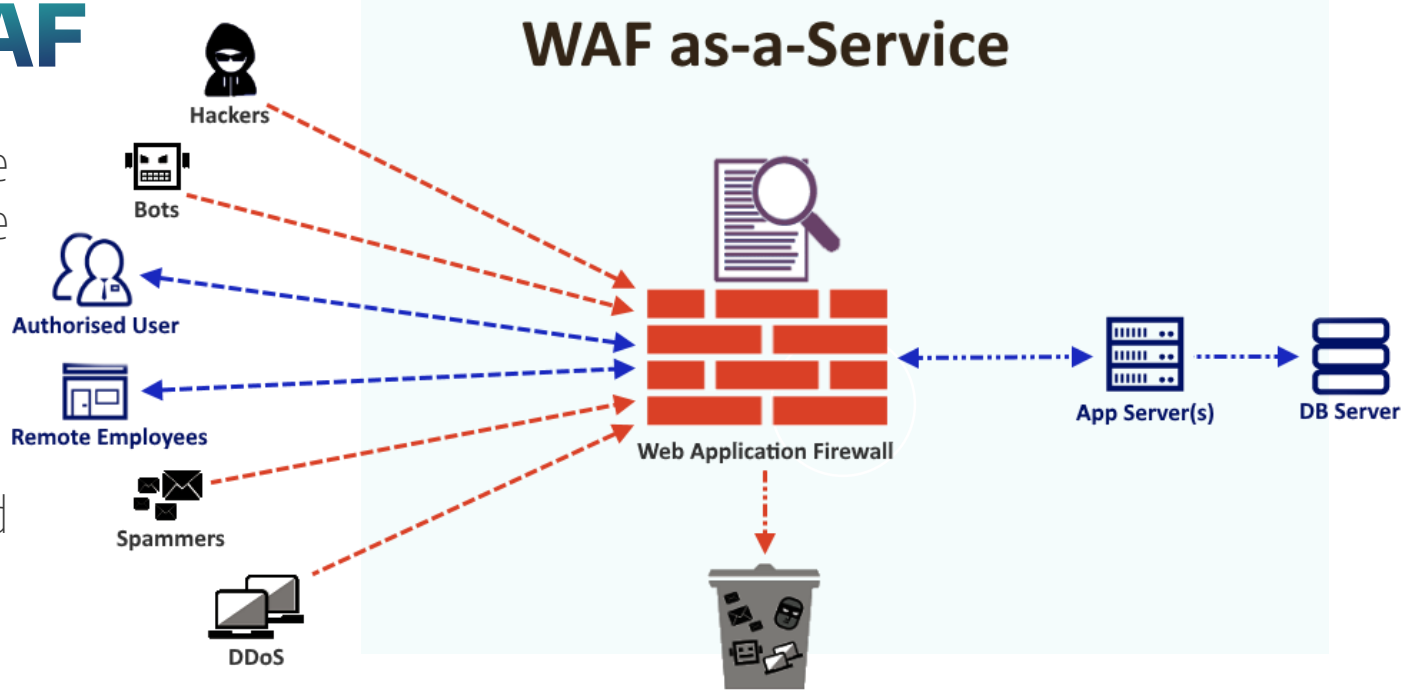


DEPLOYMENT AND **MANAGEMENT WAF**

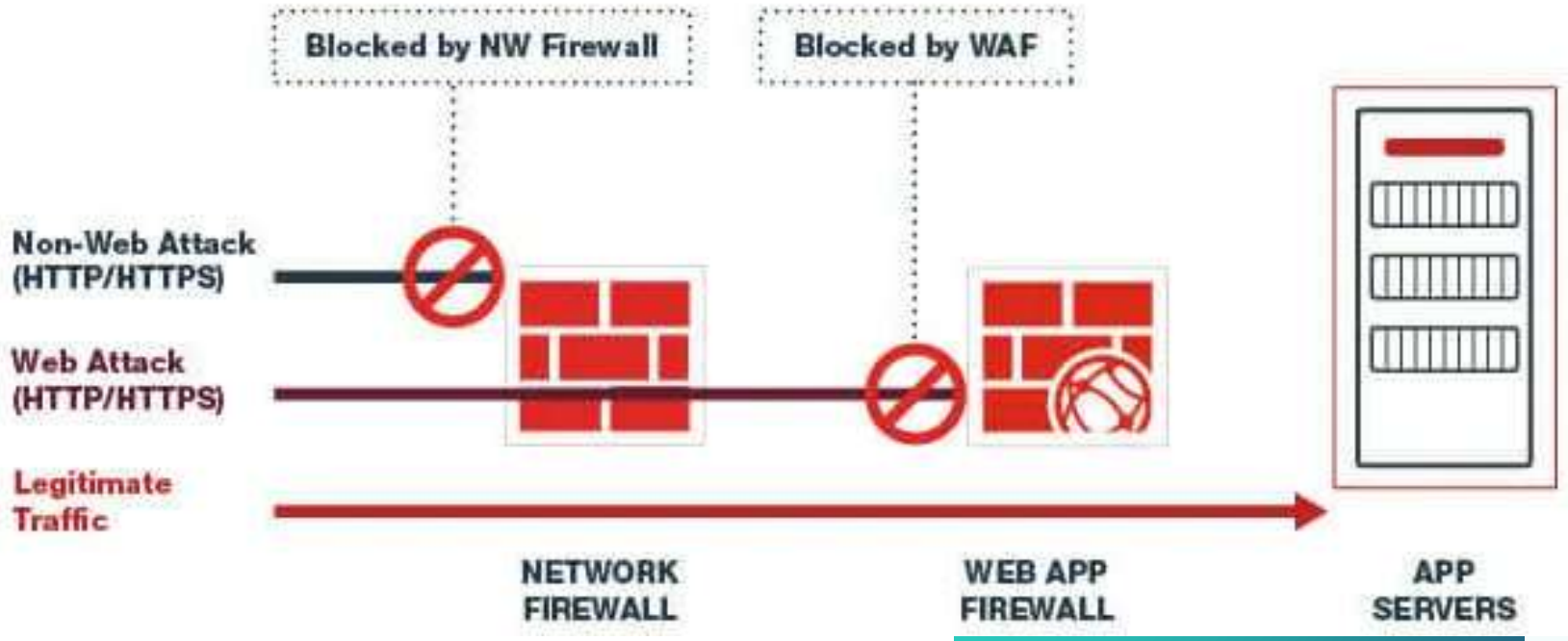
One of the last implementations we have done, speaking of security, is the WAF.

Advantages:

- Protective shield
- Detect the action of automated attacks
- App level (Layer 7) control

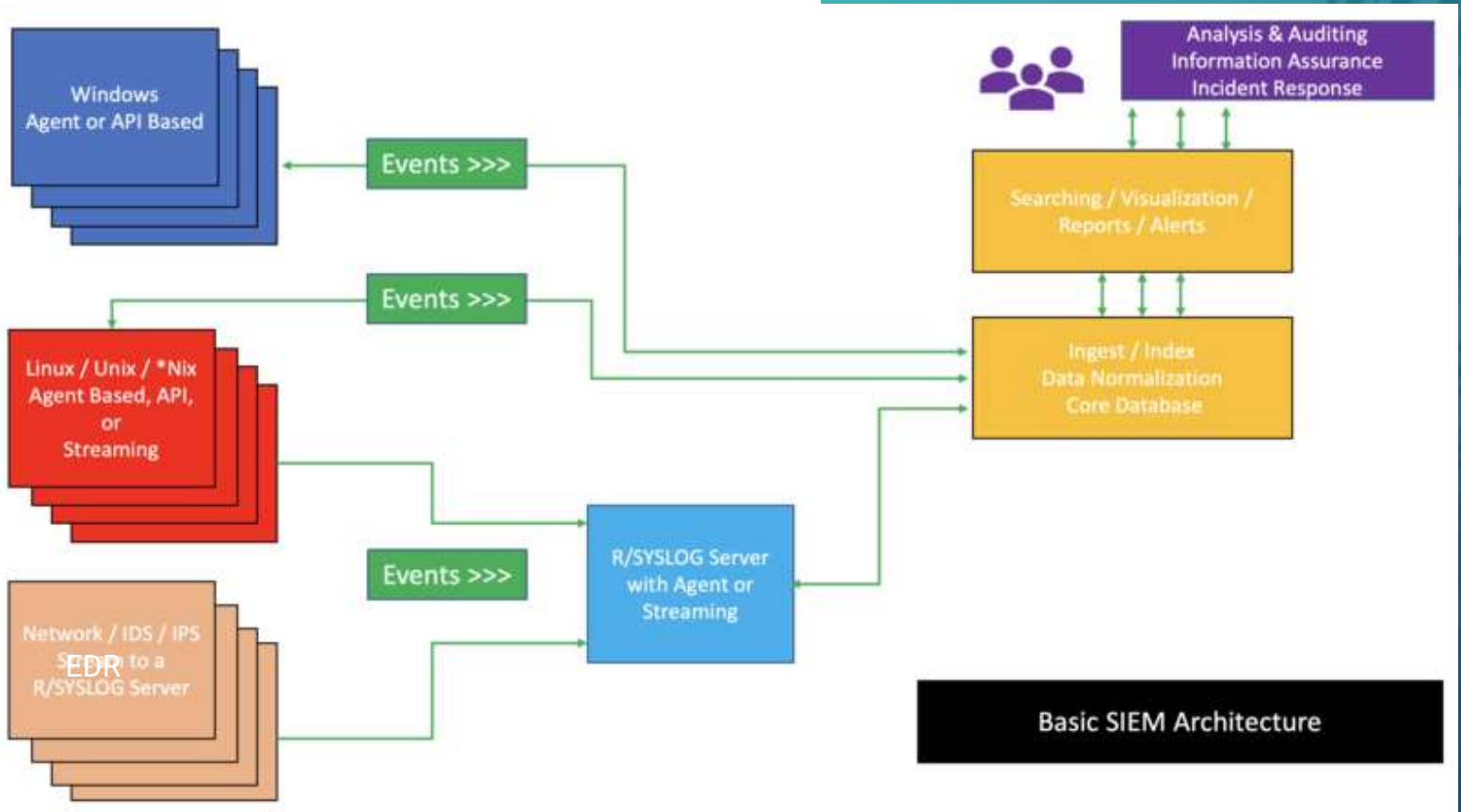


WEB APPLICATION FIREWALL vs NETWORK FIREWALL



SOC/SIEM

The Security Operations Center is responsible for ensuring the security of information and reviewing alerts that will detect an attack. This task is done by centralizing all alerts in a SIEM that correlates them and notifies of incidents.



7. Databases

InnoDB

MYSQL/MARIADB

+ Replication between instances is very spontaneous
+ Easy integration with a wide variety of software tools
+ GPL license available

- Tends to be getting slow with large databases

MS SQL **SERVER**

+ Common use
+ Data security

- It's a memory hog
- Requires a lot of maintenance

Microsoft® SQL Server®

Power BI

influxdb

INFLUXDB

- Temporal series database
- Widely used by industry to receive a date and work on it

Used as part of OT by Siemens Tecnlogy

+ Low latency, near real time
+ SQL-like language makes it easier to query
+ OSS license available

- Some operations can be hard to execute
- Must be aware of timely order to have a good performance

MONGODB

- No SQL database
- BSON
- The system of indexes and textual search is good

+ Since there is no predetermined schema, it provides a great deal of flexibility
+ No need for extra format conversion
+ SSPL License (Almost OSS)

- Memory usage maybe an issue.

REDIS

- Key value database
- Usually used as a cache
- Spends few resources
- We usually put JSON in the value

\+ It's cache can withstand failures and provide services continuously
\+ Loads millions of data pieces into the cache in seconds
\+ Has clients in all popular programming languages

\- Can requires huge RAM (if in-memory usage)
\- No GUI for managing values and keys

ELASTIC SEARCH/ APACHE LUCENE – APACHE SOLR

- Search engine
- Many options to improve the results obtained

INDEXEDDB

- Database integrated in the browser
- Fast

UNIVERSE

- A database that we have historically in the company
- Multivalue database
- It has been in use for many years, but it's very similar to the new technologies
- Current position 90 in the ranking (https://db-engines.com/en/ranking)

Rocket UniVerse

Rank Nov 2022	Rank Oct 2022	Rank Nov 2021	DBMS	Database Model	Score Nov 2022	Score Oct 2022	Score Nov 2021
1.	1.	1.	Oracle	Relational, Multi-model	1241.69	+5.32	-31.04
2.	2.	2.	MySQL	Relational, Multi-model	1205.54	+0.17	-5.98
3.	3.	3.	Microsoft SQL Server	Relational, Multi-model	912.51	-12.17	-41.78
4.	4.	4.	PostgreSQL	Relational, Multi-model	623.16	+0.44	+25.88
5.	5.	5.	MongoDB	Document, Multi-model	477.90	-8.33	-9.45
6.	6.	6.	Redis	Key-value, Multi-model	182.05	-1.33	+10.55
89.	↓ 84.	↓ 82.	Oracle NoSQL	Multi-model	4.42	-0.25	+0.01
90.	90.	↓ 83.	UniData,UniVerse	Multivalue	4.28	-0.15	-0.09
91.	↓ 88.	↑ 94.	Google Cloud Spanner	Relational	4.24	-0.26	+0.69

\+ Offer all tiers:
    User Interface (Terminal)
    Programming (UniBasic)
    Data (Files)
\+ Years of experience and self-developed resources
\- Few Connector libraries (ODBC, JDBC,.NET)
\- License by connection

8. Queues

QUEUES FOR US
ARE GREAT FOR:

Uncoupling
Fault Tolerance
Broadcasting
Control de Flow
Load balancing

ACTIVEMQ/ARTEMISMQ

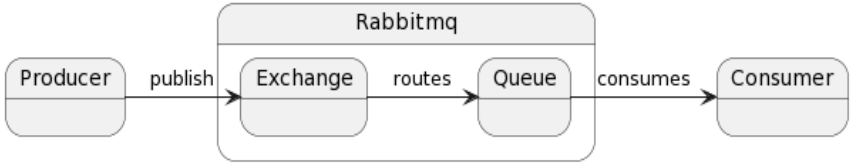
- Open source, multi-protocol, Java-based message broker.

RABBITMQ

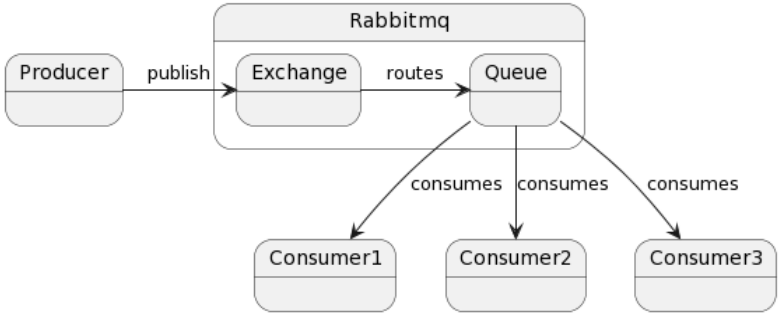
- More flexible and customizable.
- Can work with JMS, AMQP, MQTT, and with JSON through rest.
- Clustering, Quorum Queues.

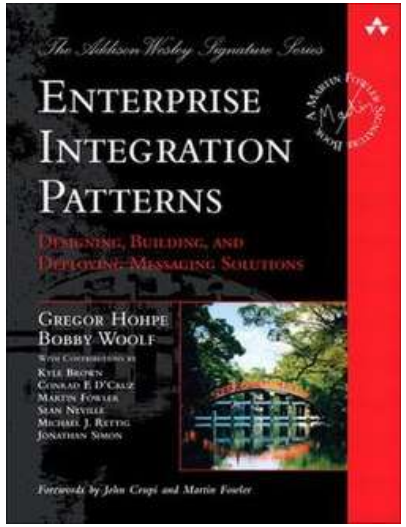
USING QUEUES

Decoupling

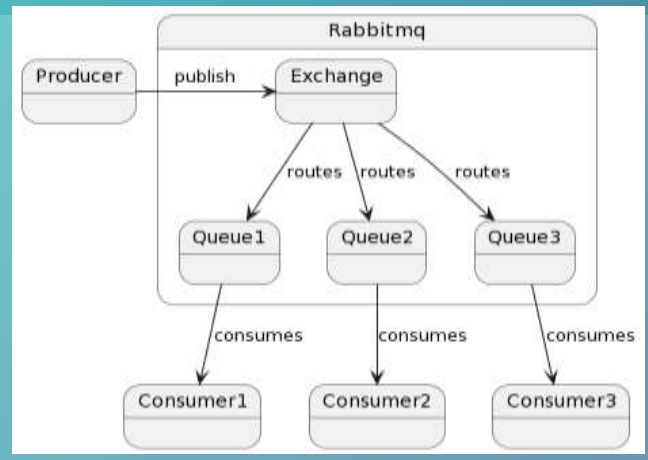


Load Balancing

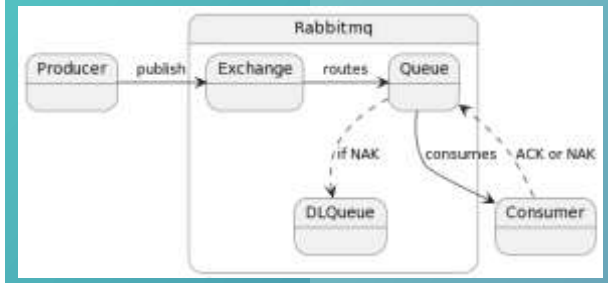




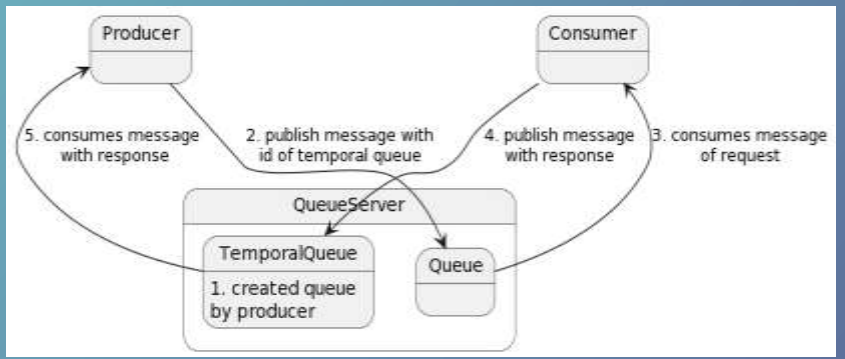
Distribution / PubSub



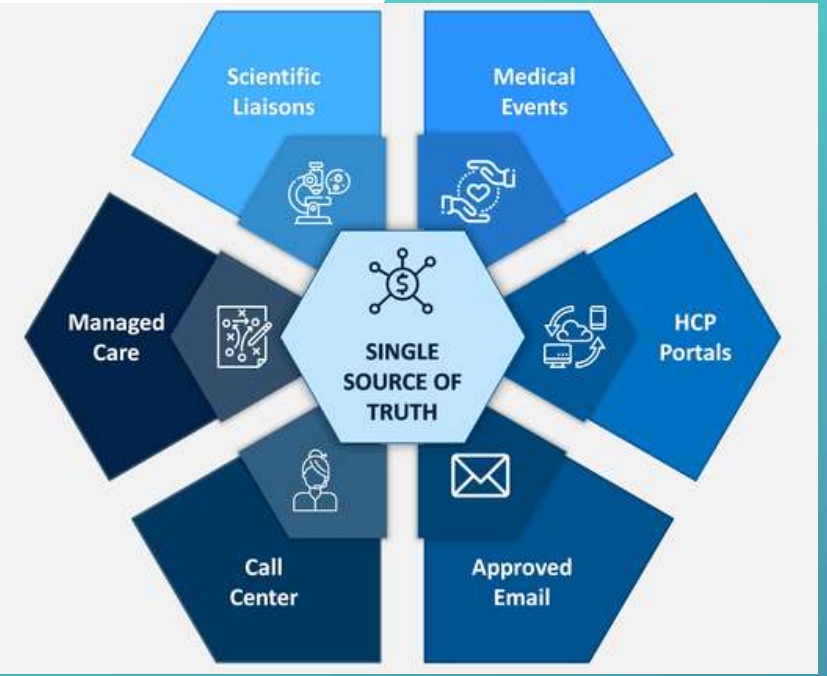
Error management



Asynchronous calls



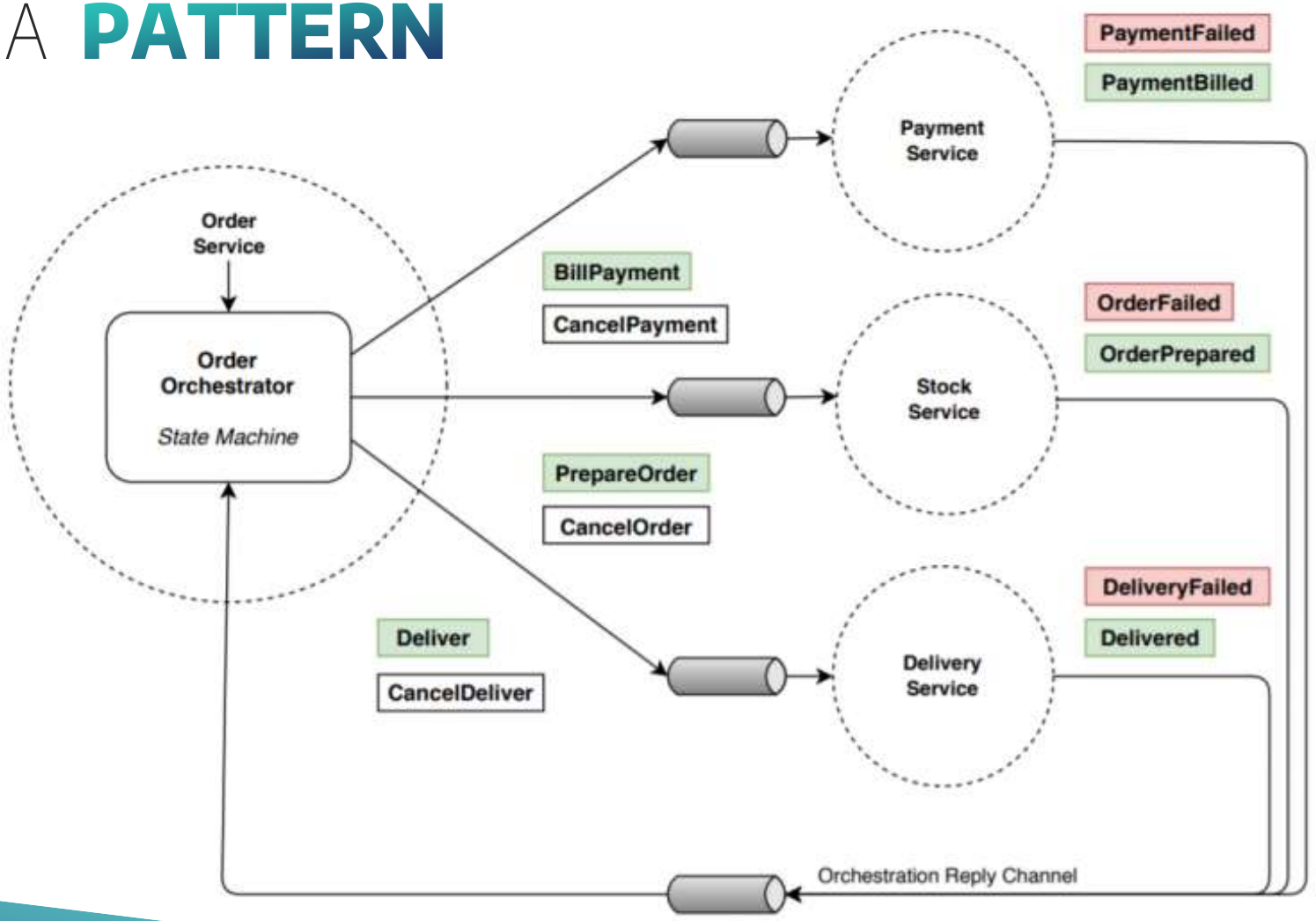
KAFKA



kafka

- Less flexible that rabbitMQ, and the user has to add new modules.
- The messages persist through the time, and the messages can be recovered.

SAGA **PATTERN**



Thanks

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