

# Featherlite Framework

## Overview and Architecture

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# Featherlite Highlights

- Reusable Java classes
- Designed for planning and scheduling
- Generic data-model configurable for application
- Performance due to in-memory processing
- Automatic persistence on databases if desired
- Integration framework for legacy applications

# Business Areas



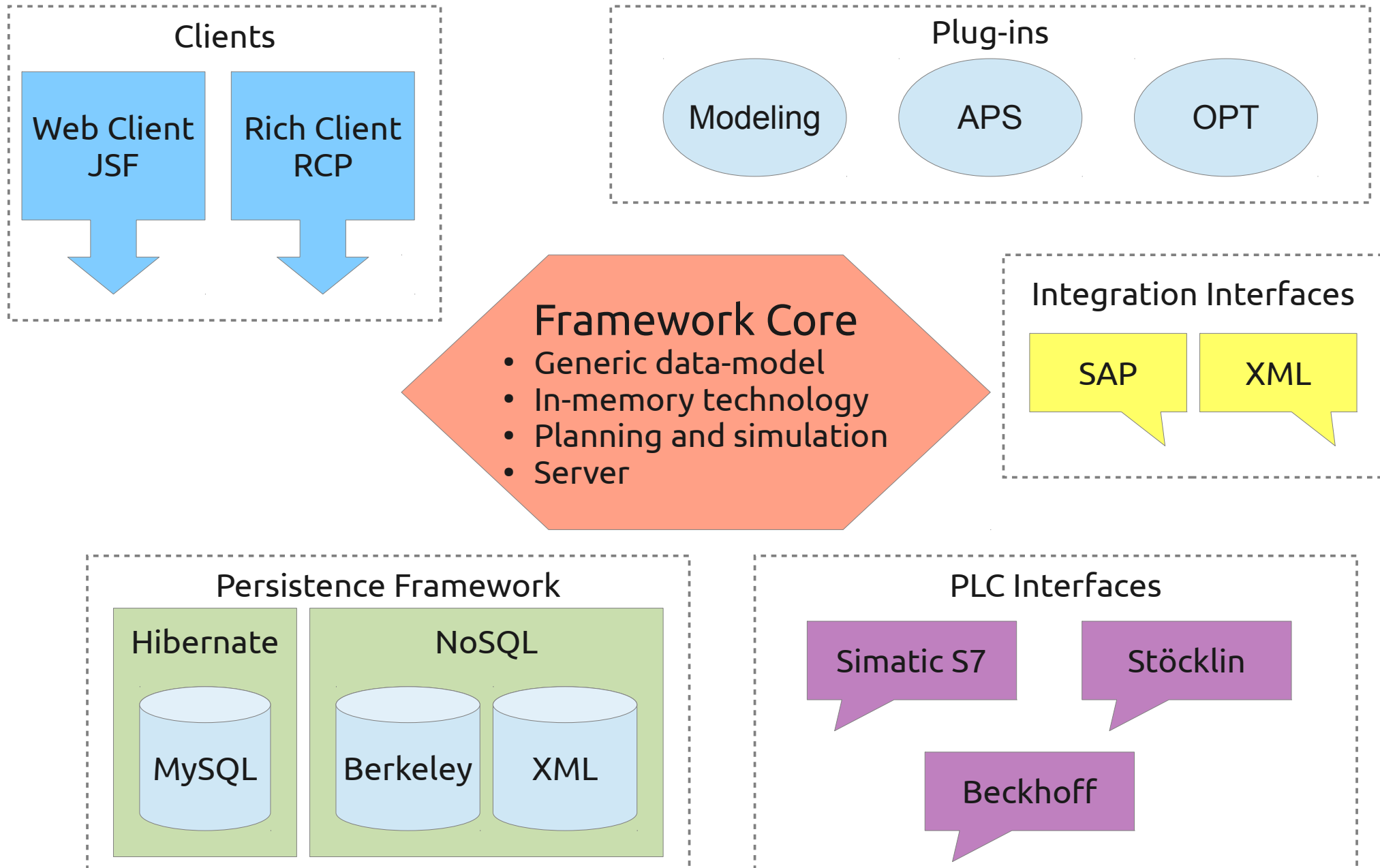
- Logistics
- Production planning and scheduling
- Asset management
- Automation industries
- Many more

- Reduced time and cost for implementation
  - Configurable and tested core business objects
  - Predefined algorithms and policies
  - Automatic persistence
- Flexibility
  - Model can be changed at run time
  - Extensible by defined programming interfaces, i.e., policies, commands, services

# Design Principles

- Object orientation
  - 100% Java
  - Component architecture
  - Implementation by design patterns
  - Configurable business objects
- Client-Server architecture
  - Micro kernel architecture
  - Heterogeneous clients, e.g., Rich clients, Web clients
- Interfaces
  - Open standards support, e.g., XML, SOAP
  - Extension and integration

# Architecture



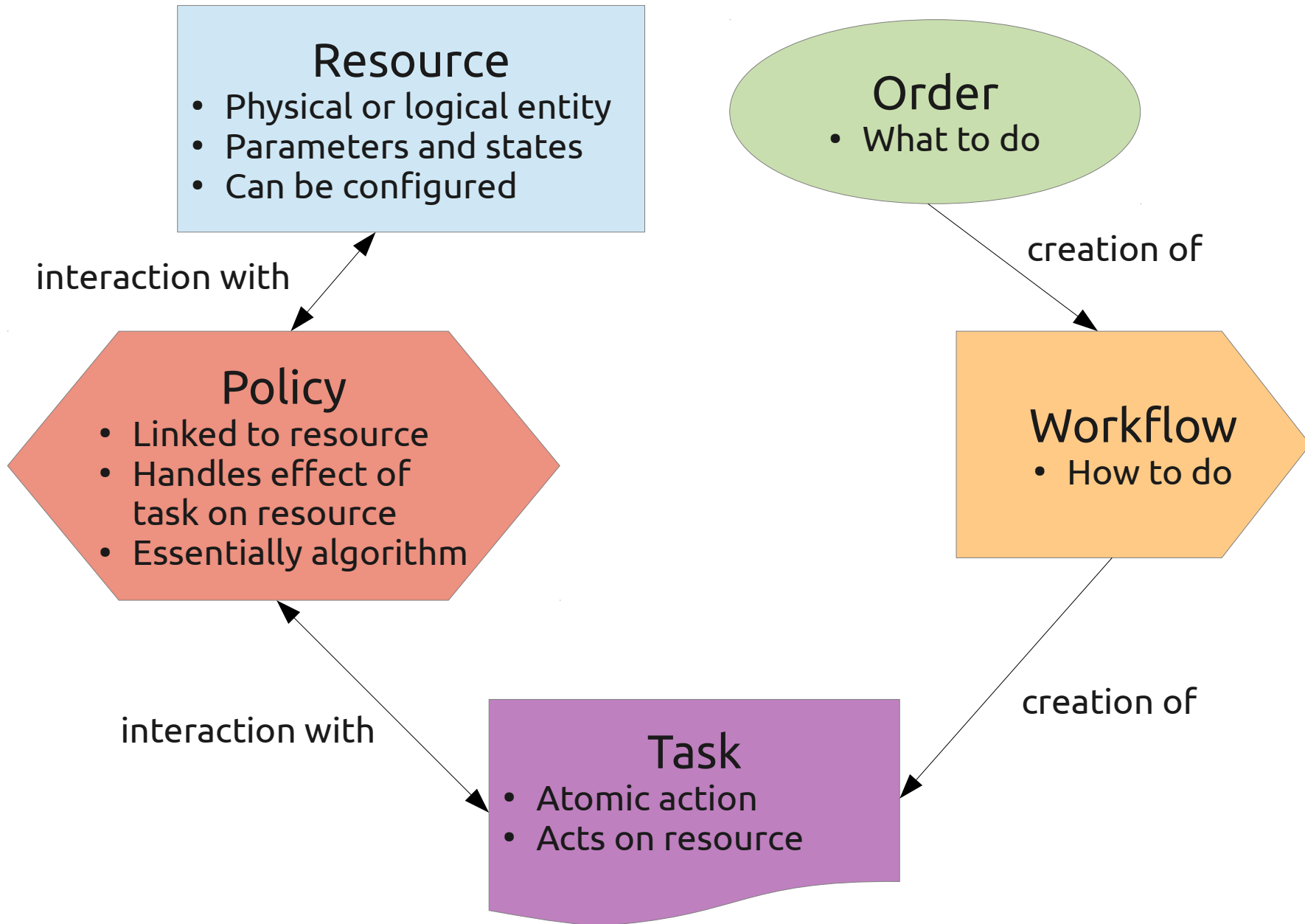
- In-memory processing
  - Create, delete, update core objects
  - Validation and violation management
- Planning and Simulation
  - Detailed planning and scheduling of workflows
  - Feasibility and availability checks
  - Simulation of processes
- Execution
  - Real-time processing of business data
  - Interaction via Integration/PLC Interfaces
  - Alerts: UI, Email, SMS, and others

# Operational Modes

- Standalone
  - Featherlite server runs as application
  - Rich client access
- Hosted
  - Featherlite server runs in application server, e.g., Tomcat
  - Rich and web client access
  - Web service interfaces



- Transient
  - Data management only with in-memory database
  - For high-performance applications
- Cached
  - Caching of objects with in-memory database
  - Changes of objects persisted in database
- Transactional
  - Data management only in database
  - Transactional queries and services (ACID)



# Example: Warehouse Model



## Resource

- Parameter  
name='id' value='rob01'
- State Variables  
name='position' value='origin'  
name='load' value='pal26'

## Resource

- Parameter  
name='id' value='pal26'  
name='weight' value='512kg'  
name='ware' value='coffee'

## Order

- Parameter  
name='transport'  
name='load' value='pal26'  
name='source' value='shelf67'  
name='target' value='exit23'

## Workflow

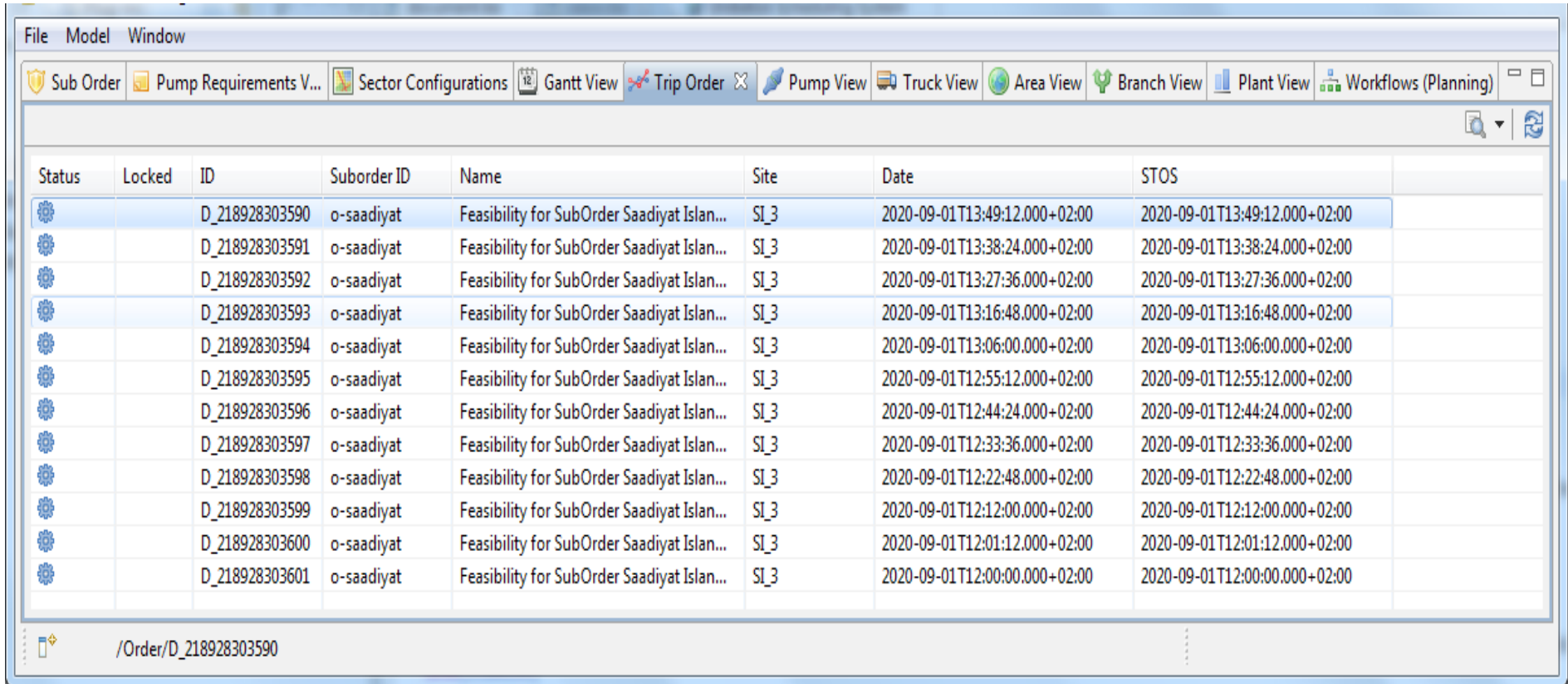
### Task

- Parameter  
name='driveto'  
name='robot' value='rob01'  
name='position' value='shelf67'

- Modeling Language
  - Generic XML
  - Templates for automatic resource generation
  - Scripts for automatic workflow generation
- Model Editor
  - Rich client interface for modeling

# Runtime Components

- Services
  - One service per use-case
  - Additional use-cases can be added
- Scheduler
  - Planning of tasks on resources
  - Feasibility checks
- Handler
  - Persistence management
  - Integration management

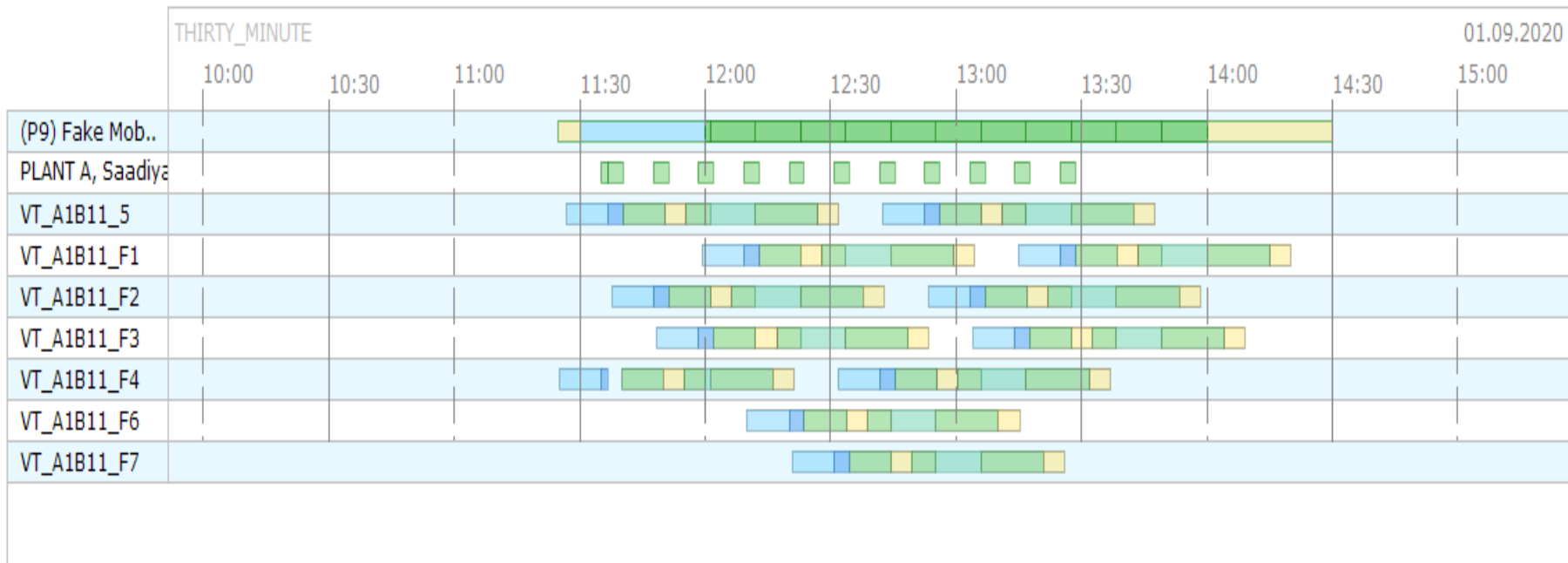


The screenshot shows a software interface with a menu bar (File, Model, Window) and a toolbar with various view options: Sub Order, Pump Requirements V..., Sector Configurations, Gantt View, Trip Order, Pump View, Truck View, Area View, Branch View, Plant View, and Workflows (Planning). Below the toolbar is a table with the following columns: Status, Locked, ID, Suborder ID, Name, Site, Date, and STOS. The table contains 12 rows of data, all with a gear icon in the Status column and a lock icon in the Locked column. The Name column contains truncated text: "Feasibility for SubOrder Saadiyat Islan...". The Date and STOS columns contain ISO 8601 timestamps.

Status	Locked	ID	Suborder ID	Name	Site	Date	STOS
⚙️	🔒	D_218928303590	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T13:49:12.000+02:00	2020-09-01T13:49:12.000+02:00
⚙️	🔒	D_218928303591	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T13:38:24.000+02:00	2020-09-01T13:38:24.000+02:00
⚙️	🔒	D_218928303592	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T13:27:36.000+02:00	2020-09-01T13:27:36.000+02:00
⚙️	🔒	D_218928303593	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T13:16:48.000+02:00	2020-09-01T13:16:48.000+02:00
⚙️	🔒	D_218928303594	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T13:06:00.000+02:00	2020-09-01T13:06:00.000+02:00
⚙️	🔒	D_218928303595	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:55:12.000+02:00	2020-09-01T12:55:12.000+02:00
⚙️	🔒	D_218928303596	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:44:24.000+02:00	2020-09-01T12:44:24.000+02:00
⚙️	🔒	D_218928303597	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:33:36.000+02:00	2020-09-01T12:33:36.000+02:00
⚙️	🔒	D_218928303598	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:22:48.000+02:00	2020-09-01T12:22:48.000+02:00
⚙️	🔒	D_218928303599	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:12:00.000+02:00	2020-09-01T12:12:00.000+02:00
⚙️	🔒	D_218928303600	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:01:12.000+02:00	2020-09-01T12:01:12.000+02:00
⚙️	🔒	D_218928303601	o-saadiyat	Feasibility for SubOrder Saadiyat Islan...	SI_3	2020-09-01T12:00:00.000+02:00	2020-09-01T12:00:00.000+02:00

At the bottom of the window, there is a breadcrumb path: /Order/D\_218928303590.

- Based on Eclipse Rich Client Platform
- Generic tabular views on resources, order, etc
- Views on customer needs/requests



- Gantt charts
- Workflow charts
- Graphical views on production sites

The screenshot shows the Apixxo web client interface in a Mozilla Firefox browser window. The page title is "THERAPY" and the patient is "Haag Eva Dummy, 01.01.1970". The patient's state is "Active" and the institution is "Heim Horizont". The last activation was on 28.09.2011 at 09:40:41.

Therapy Active		08:00		13:00		18:00		23:00		Note	Reserve	Physician
AALBORG Bärlauch Kaps D 1 28.09.2011 - open	-	-	08:10 1/2	-	-	-	-	-	-	-	✗	CAT ▼
DAFALGAN 150 Supp 150 mg 28.09.2011 - open	-	-	-	X 7	-	-	-	-	-	-	✗	CAT ▼
Tic Tac 28.09.2011 - open	-	2	-	-	-	3	-	-	-	-	✗	CAT ▼

Buttons: Show therapy report, Close, Modify therapy

- Based on Java Server Faces
- Generic tabular views on resources, order, etc



- Forward planning
  - As soon as possible
  - Tasks as close to release date as possible
- Backward planning
  - Just in time
  - Tasks as close to due date as possible
- Feasibility and availability checks
- Specific algorithms

# Optimization

- Cost calculation integrated
- Library of optimization algorithms
  - Maximum flows
  - Assignment problem
  - Shortest path
  - Minimum spanning trees
  - Simulated annealing
  - Design on request

- Lean, performing, flexible platform
  - Service architecture
  - Modeling language and editor
  - Policy architecture reduces complexity
  - Flexibility by predefined but configurable core objects
  - Performance by in-memory database
  - Automatic persistence if desired
- Integration
  - Open standards for simple integration
  - Framework for communication with legacy systems