



## The architecture at work

Figure 3 is a UML model that describes how a call from a client or a web page is carried on by the Fluidtime system.

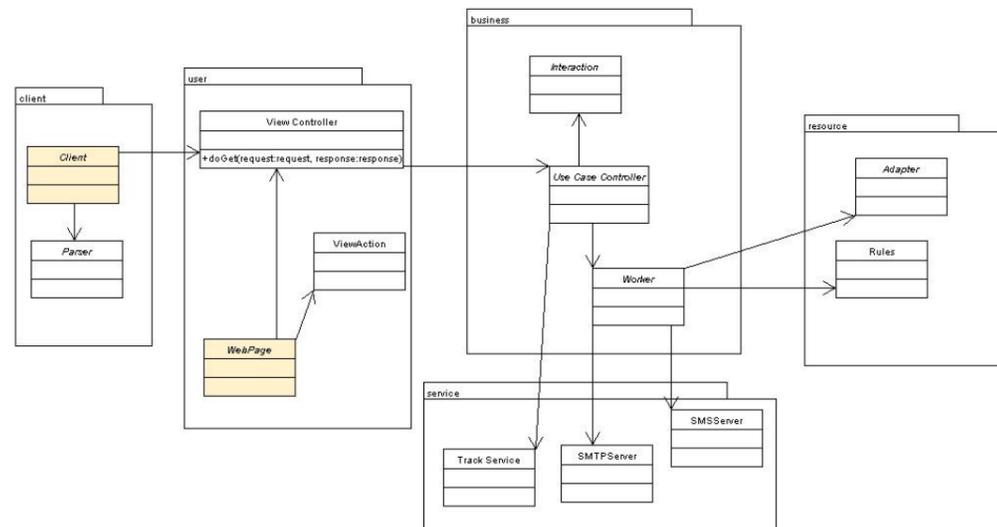


Figure 3: Fluidtime serving a request.

The interaction among the different tiers is as follows:

1. a PULL call comes from a Client or a WebPage to the ViewController;
2. through the "App" parameter, the ViewController forwards the call to the appropriate UseCaseController (either the FTController, the PTTController or the WMController); there's a UseCaseController for each service available (plus one for the general management of the system)
3. the proper UseCaseController has an Interaction class that resolves constant values and some Workers that perform the business logic. Different Worker can act at a different granularity of the business logic. Every interaction with the UseCaseController represents a service request, it is tough traced by the TrackingService.
4. Each Worker can interact with Services or Adapters to get or set information (eventually from an information provider), to use a channel different than the web one.

If the interaction is a PUSH, it is stimulated by one of the clients and is converted in a PUSH call to the system by the client itself.

## The enabling technology

Fluidtime is a j2ee web application [J2EE]. It uses the Jakarta Tomcat [TMC] as a servlet engine and an XML file as persistent storage. It was developed on the Java JDK 1.4.0 [JDK], using the NetBeans IDE [NB].

The following open source libraries make up the service tier:

- log4j, to support the logging and tracing facilities [LOG4J];
- mailapi and smtp, to implement the mail channel [MAIL];
- mx4j-jmx, to integrate with the tomcat user DB [JMX];
- struts, as web application framework [STRUTS];
- javacomm, to connect to the serial port of the washing machine and GSM modem [JCOMM];
- xalan and xerces, to support the XML parsing [XML];
- javacc, to implement the SMS message parser [JAVACC];

## References

- [FT] The Fluidtime website <http://www.fluidtime.net/>
- [ARCH] Paul Harmon, Michael Rosen, Michael Guttman *Developing E-Business Systems and Architectures: A Manager's Guide*.
- [JAVA] Java Development Kit version 1.4.0 <http://java.sun.com/j2se/1.4/index.html>
- [J2EE] Designing Enterprise Applications with the J2EE Platform [http://java.sun.com/blueprints/guidelines/designing\\_enterprise\\_applications\\_2e/index.html](http://java.sun.com/blueprints/guidelines/designing_enterprise_applications_2e/index.html)
- [NB] Netbeans java IDE <http://www.netbeans.org/>
- [TMC] Tomcat servlet engine <http://jakarta.apache.org/tomcat/index.html>
- [XML] Xalan XSL parser <http://xml.apache.org/xalan-j/index.html>  
Xerces XML parser <http://xml.apache.org/xerces-j/>
- [LOG4J] Log4j framework <http://jakarta.apache.org/log4j/>
- [MAIL] Javamail framework <http://java.sun.com/products/javamail/>
- [JMX] Mx4j framework <http://mx4j.sourceforge.net/>
- [STRUTS] Struts framework <http://jakarta.apache.org/struts/>
- [JCOMM] Javacomm framework <http://java.sun.com/products/javacomm/>
- [JAVACC] Javacc parser generator <http://javacc.dev.java.net/>



# Fluidtime

Time services and tools to help people's flexible lifestyles

## IDEA/PROBLEM/CONTEXT

People are adopting in their life and work new habits regarding time: increased use of mobile phones to quickly schedule or change appointments, for instance. This technologies allow us to live our lives according to Kairos, the Greek god of event-based, opportunistic time, rather than Chronos—measured time. We can do things when we feel like it, rather than when the timetable says we must. Aside from the phone, however, few tools or services support this new way of life, especially when people interact with public or private services. They currently have limited access to timely information about public services or even private appointments and are left wondering when their bus will arrive or whether their doctor is on time.

## WHAT IS IT?

Fluidtime is a set of services and their interfaces to support a flexible lifestyle. It connects people to personalised, time-based information about the service sought, for instance the bus arrival times, or the appointment time of a medical check-up. Thus it challenges the paradigm of the rigid clock and calendar by introducing the aspect of flow to the coordination of everyday service interactions.

## HOW DOES IT WORK?

Fluidtime uses a technical infrastructure, which provides accurate time updates directly from the real-time databases of the service organisations. People can connect to this system through their mobile phones or specially designed products and view changes in the schedules in a constant and ambient way.

Two service systems and their interface prototypes were produced to show how using Fluidtime can be simple, effective and enjoyable. The first is for public-transport users in Turin. Travellers can find dynamic information while on the move on mobile phone or at home or the office, on mechanical display units. They can set the interfaces to track any bus-stop in Turin and watch the buses as they approach the stop.

The other service is a personalized, flexible scheduling system to support the coordination of shared resources. It is implemented for Interaction-Ivrea students to organize their laundry facilities. They use a web-browser or the SMS functionality of their mobile phones to reserve, cancel or negotiate times to do their laundry. As clothes are being washed, mobile and stationary tools give users constant updates about the progress of their laundry cycle; an intelligent reminder function warns them when they forget to pick up their finished laundry.

## POTENTIAL/RELEVANCE

Ever since Benjamin Franklin made his "Time is Money" statement, time has become an important and valuable business factor. In some cases, time has been the only product that was sold. For example in the 19th century in the USA, Samuel Langley broadcasted the observatory's time signal and other cities paid him in order to receive and use this standard time in order to coordinate train schedules.

Especially today, people are willing to pay for time since it is a highly-valued commodity, that is bought, sold and traded over digital networks. A survey that was done after the implementation of the new traffic information system in Turin indicates that people would be willing to give money for real-time arrival information.

Fluidtime developed tools and services that can equip companies and governmental organisations with the right means to improve the time based customer relationship as well as create a new revenue opportunities. Further it brings new flexibility to the management of shared resources, may it be the washing machine or a company car..

## Interaction-Ivrea innovation project

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