

# Next Generation Internet Interaction System: Thelma

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*This document describes Thelma, the Next Generation Internet Interaction system based on Ajax technology for Web 2.0 allowing for unobtrusive rich interaction using just a web browser.*

## Background

Rich interaction on the Internet can be divided into two main categories, Instant Messaging or web based conferencing. The former comes from the approach of chat (couple or group) where you add media as you need them while the latter comes from a full application approach where an application is either pre-installed or downloaded on demand. This full application is (in most cases) targeted towards a meeting experience where all media are used for a limited period of time.<sup>1</sup> In both cases the interaction is application bound and disconnected from the user activity and the downloading and installing of applications is a barrier for the interaction to start.

At the same time, the Internet is becoming more and more web centric where applications are developed to be run inside a web browser. Examples of such applications include Google Mail, Google Maps and Microsoft Live among many others. This new type of application deployment and usage is loosely referred to as Web 2.0.

A central part of Web 2.0 is the so called Ajax, **A**synchronous **J**avaScript **A**nd **X**ML framework, where applications are designed to run in a web browser asynchronously from the web server. I.e. the web server is only contacted for new web content when needed, and the local browser creates a user interface that allows the user to interact with the application and the local browser updates the presented information as needed. Relating to the Google Mail application mentioned above, the user interface is presented locally in the browser and raw mail information is fetched from the server and only when the users interacts in a way that creates persistent changes the web server is contacted. This should be compared to the traditional way of developing web applications where each page change and interaction generates a communication request to the web server which returns a new web page.

One major advantage of Ajax is that it is based on JavaScript which is a central part of all modern and popular web browsers, which in turn means that no extra browser plugin is needed to run the code and only a lightweight web application is downloaded. This allows for a very fast deployment as well as an integrated experience for the user.

## Next Generation Internet Interaction, Thelma

With the goal to make rich interaction over the Internet less obtrusive, we propose a new approach to web based interaction where Ajax technology is utilized to create the *Next Generation Internet Interaction System*, called *Thelma* where the heavy rich interaction application is broken up into several smaller web application components supporting different types of interaction, e.g. chat, whiteboard, video, audio etc.

The Thelma components would allow web site creators to incorporate interaction possibilities directly into normal web pages. The web site creator would choose which types of interaction methods should be available on different web pages and how the interaction should be grouped between different pages or even different web sites.

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<sup>1</sup> A special case is the [Virtual Office](#) where a meeting is on going continuously for 24 hours a day.

Imagine that a group video component “follows” the user between various web pages when browsing a certain project server allowing for the browser to interact with other interested parties. This could be open to anybody in the world browsing that particular web server or it could be limited to a certain closed group (e.g. active participants in a specific project). Another example might be students attending a course or just web users interested in a specific topic, e.g. Lappish literature.

Due to the lightweight framework of JavaScript not everything can be done in JavaScript (due to both security and technical implied limitations) and we propose here that the Thelma components are extended with heavier Java components that would allow for more functionality. Examples might be transmission of audio and video from the web browser which is something the JavaScript environment would not allow (today). This heavier Java component would require that Java is installed in the browser, and if this is not the case, i.e. Java is not installed then the Thelma system would be tolerant and still provide some basic functionality.

## **Interaction with existing Marratech E-Meetings**

The backend of the Thelma system would be the existing Marratech Manager system which would provide a gateway into existing Marratech room-based e-meetings allowing for interaction between Thelma users and Marratech users. In this respect the Thelma system could be seen as a web based front-end to Marratech e-meetings allow for both one-way (receive only) and two-way web based interaction.

The user should be able to switch between Thelma and Marratech interaction as they prefer in real-time. I.e. depending on needs, e.g. mobility different applications could be used to access the same information but with different interaction possibilities.

A further advantage of leveraging on the existing Marratech Manager is its support for gateways to H323 and SIP systems which in turn would allow for lightweight H323/SIP interaction in a web browser using the Thelma.

An important aspect when integrating into a commercial solution is how to handle licensing of existing limited resources. E.g. when integrating with the Marratech Manager which has a per room or per user based licensing system. how can the Thelma be a good player in such an environment. It is important to take this question into account when designing the new interaction system and not leaving it for “later”.

## **Firewalls**

Firewalls always present a special challenge and conflict when discussing rich communications. Most firewalls allow for “normal” Internet traffic such as web communication and email and block almost everything else.

Some technical background, Internet traffic can be divided into categories from a transport perspective: UDP and TCP. UDP stands for User Datagram Protocol and is very simple. It leaves all control (e.g. handling congestion and retransmission) to the application using the protocol. UDP is very suitable for using with real-time media applications as it allows the application to adapt quickly to changes in the network. TCP which stands for Transmission Control Protocol on the other hand includes control of the transmission and stops the insight from the application to the current state of the transmission. TCP is very suitable for applications that contain a state that they want to exchange with a server. E.g. sending an email from a client application to a server where all data is important and should reach the server. The biggest problem with using TCP for real-time media distribution is its property where you cannot cancel transmitted data, i.e. if a packet is lost in the network it will be retransmitted until it is delivered. HTTP, the protocol used for transferring Web content uses TCP.

UDP is best suited for rich media applications while TCP is much friendlier to firewalls, i.e. it is easier to traverse a firewall when using TCP. Of course different installations might prevent traffic to different degrees, where company firewalls are usually more restrictive than private firewalls.

The Thelma framework will utilize different connection technologies for different levels of interaction where the lowest level will use HTTP over TCP for data transmission and thus allowing for simpler interaction between different parties.

## Mobility

A challenge for realizing today's rich interaction is how to support mobility where users switch between different carriers and different devices throughout the day. Today's approach is to create special applications for each mobile device (PDA, phone, laptop etc.) while at the same time the web browsers in these devices become more powerful and support many types of rich web content (e.g. JavaScript and Ajax). Enabling rich media via Thelma will allow for transparent interaction on these mobile devices.

## Challenges and Questions

A number of challenges and questions exist in the creation and usage of Thelma:

- **AJAX:** How can the AJAX platform be utilized for creating applications for interaction?
- **Browser User Interface:** How should the Thelma interaction components be designed to allow for unobtrusive web based interaction?
- **User Behavior:** Will this new possibility for creating rich interactive applications make it easier for users to interact and allow for a higher degree of rich interaction on the Internet?
- **Mobility:** How far can mobility be supported by using the Thelma framework.
- **Client Change:** How should the transparent client change be designed when switching between different grades of interactivity?
- **Firewalls:** How should the firewall problem be handled to allow as many as possible to interact?
- **Backend E-Meeting Gateway:** How should the backend E-Meeting Gateway be designed to support many concurrent clients?
- **Licensing:** How should licensing be handled when using the Thelma interaction components?

## Summary and Conclusions

We have presented the Next Generation Internet Interaction: Thelma which would allow for unobtrusive web based rich interaction using Ajax components in a web browser. Thelma builds on the idea of the Web 2.0 paradigm where the web browser will be the users central work tool.

The Thelma system would cut down on the barrier hindering rich interaction and allowing any user with a modern web browser to be able to interact with other users on the Internet and interact with existing e-meeting users.

Web site creators would be able to enhance their sites with components for rich interaction as well as be able to create user interfaces to rich meetings online to their own liking. A web page with only rich interaction components would allow for individual user interfaces and also allow for ubiquitous integration into any type of existing web systems (LMS, news, file sharing, mail, etc.).

Users would be able to transparently move between Ajax based lightweight Thelma applications to/from the heavier Java based Thelma applications and to/from the full Marratech client.

The main advantage between Thelma and earlier technology will be the component based interaction scheme where interaction can be done based on the end-users own technical possibilities and gracefully handle different types of available hardware and software.

To conclude, the Thelma system would enable users anywhere to interact in a rich manner using only their standard web browser.