Universal Profiling for Content Negotiation and Adaptation

Tayeb Lemlouma
Nabil Layaïda

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Tayeb.Lemlouma@inrialpes.fr

Opera Project
INRIA Rhône-Alpes, France

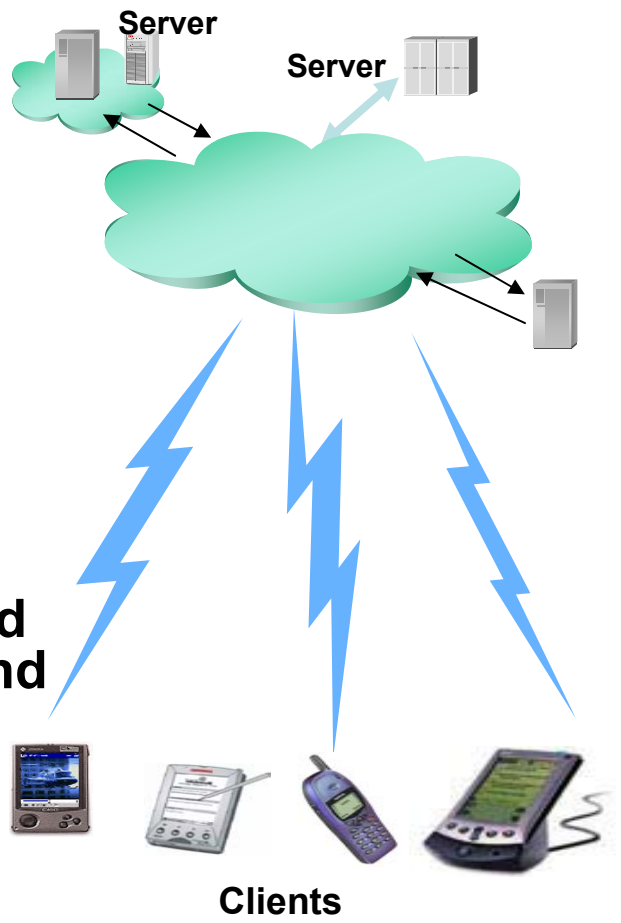
Introduction

Explosive progress in computing technologies

Multimedia systems become heterogeneous more and more

In this new situation:

Adapted content must be delivered according to clients preferences and capabilities

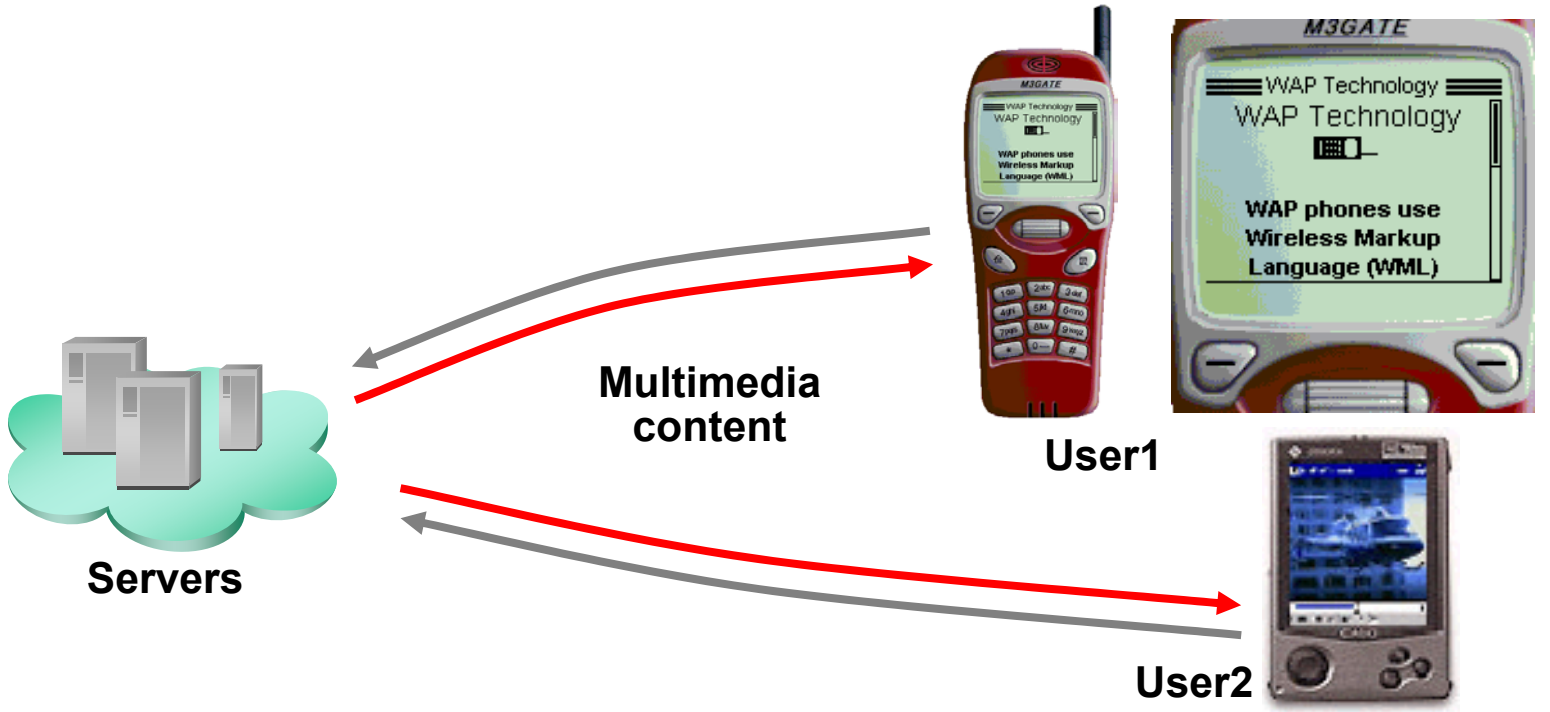


Introduction

- **Objective: Designing an adaptable multimedia system that allows:**

  a) server content adaptation

  b) content negotiation according to clients profiles



The universal profiling

- An efficient approach to design a complete content adaptation and negotiation solution

- Indispensable in the design of adaptable multimedia system in heterogeneous environments

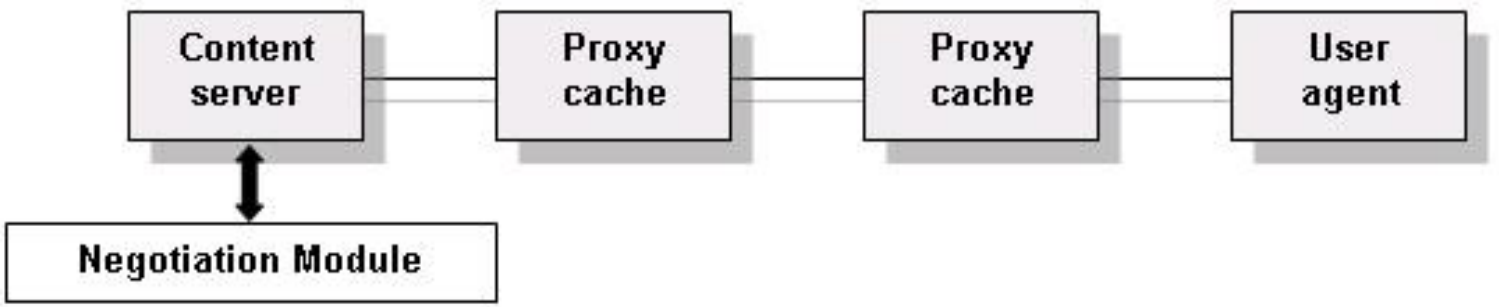
Why?

- Allows to give a precise idea about all the components of the multimedia system: clients, network, services, server capabilities, etc.

- These descriptions are necessary to achieve an advanced content negotiation strategy

Client Description in HTTP

Clients description in HTTP (HTTP 1.0 and TCN)



Problems

- Sending huge accept head requests
- Accept head doesn't give a good client description
- Clients have limited processing powers and can't performs the negotiation tasks (HTTP/1.1)
- HTTP protocol description isn't efficient

Profiling Schemas

In order to meet the content negotiation needs, we have designed a universal schema

Our schema includes

A) Client:

1/ Client Profile (platform: software & hardware, main services)
2/ Client Resource Profile (services requirements detail)

B) Server:

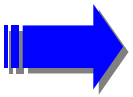
3/ Document Instance Profile (HTML, WML, etc.)
4/ Resource Profile (wbmp, jpg, gif, au, etc.)
5/ Adaptation Method Profile (XSLT style sheet, programs, scripts, etc.)

C) Network:

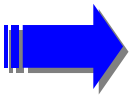
6/ Network Profile (network speed, bandwidth, sessions, etc.)

Schemas Definition

The definition is based on

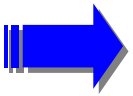


CC/PP: Composite Capabilities/Preference Profiles
http://www.w3.org/2000/07/04-ccpp#



RDF: Resource Description Framework
http://www.w3.org/1999/02/22-rdf-syntax-ns#

+



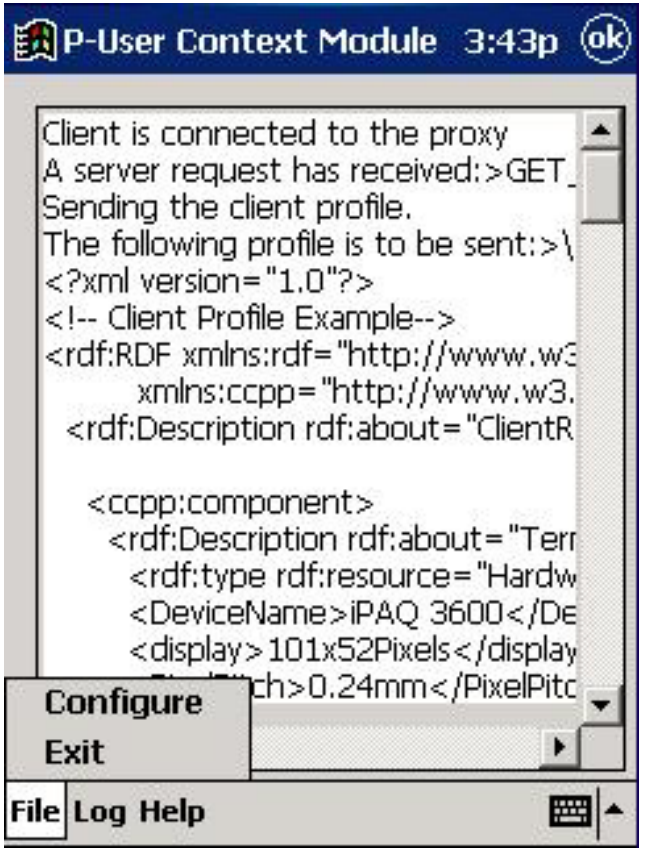
Extension:
Proper to the Content Negotiation
http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/NegotiationSchema/*03012002#

A Profile Example

```
<?xml version="1.0"?>
 <rdf:RDF          xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
                   xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#“
                  xmlns:neg="http://www.inrialpes.fr/opera/people/Tayeb.
                   Lemlouma/NegotiationSchema/ClientProfileSchema03012002#">
 <rdf:Description rdf:ID="ClientResourcesProfile">

    <ccpp:component>
          <rdf:Description rdf:about="TerminalHardware">
          <rdf:type rdf:resource="http://www.inrialpes.fr/...HardwarePlatform"/>
               <neg:DeviceName>Ericsson-R320</neg:DeviceName>
               <neg:screen>30x23mm</neg:screen>
               <neg:PixelStretch>1.24</neg:PixelStretch>
          </rdf:Description>
    </ccpp:component>

   <ccpp:component>
          <rdf:Description rdf:about="MultimediaServicesRequierement">
          ……
          </rdf:Description>
   </ccpp:component>

</rdf:Description>
</rdf:RDF>
```

An Implementation Example: NAC

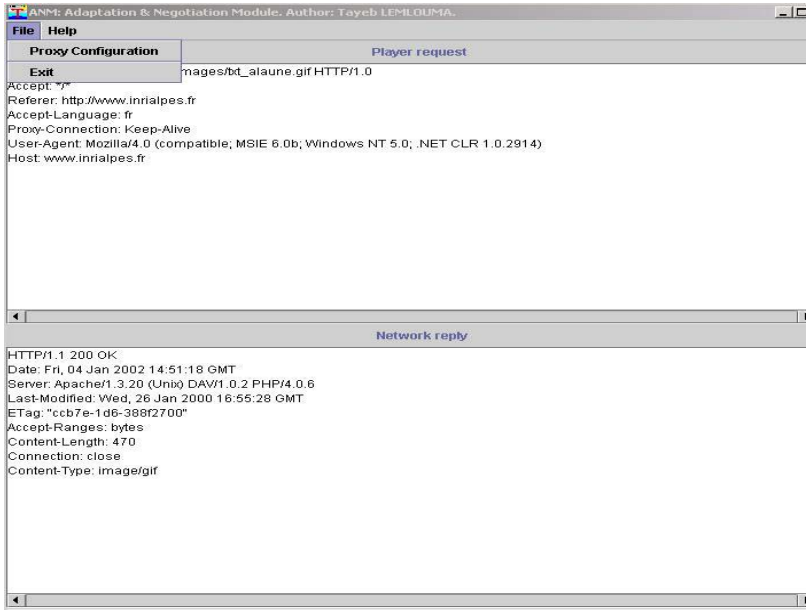
1 ANM Module
2 UCM Module
3 Adaptation methods:
- Text to speech
- Adaptation to SMS messages
- Images conversion (java, etc.)
- XHTML to WML (XSLT, etc.)

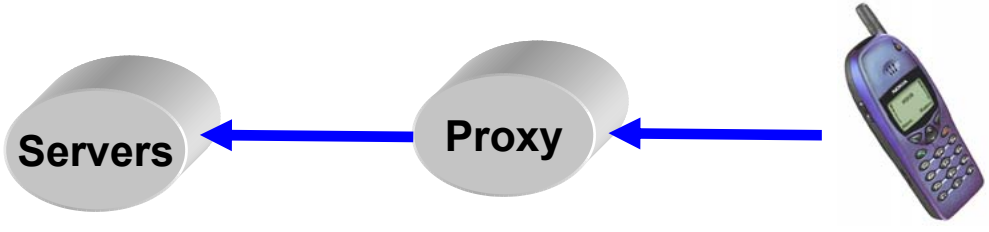


1- The ANM in Proxy

- **The Adaptation & Negotiation Module allows:**

- **Handling directly client requests**
- **Client and server profiles processing**
- **Services deliverance**
- **Support of adaptation enrichment**
- **Cooperation with the UCM module.**



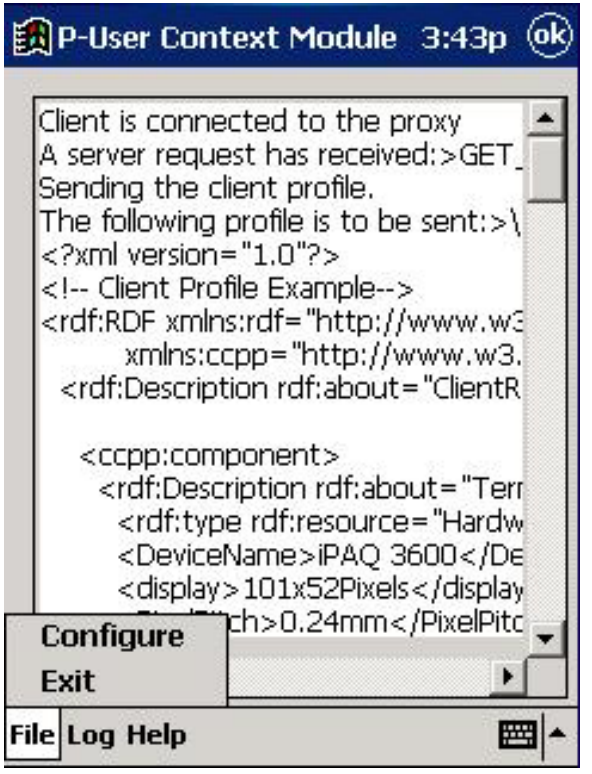


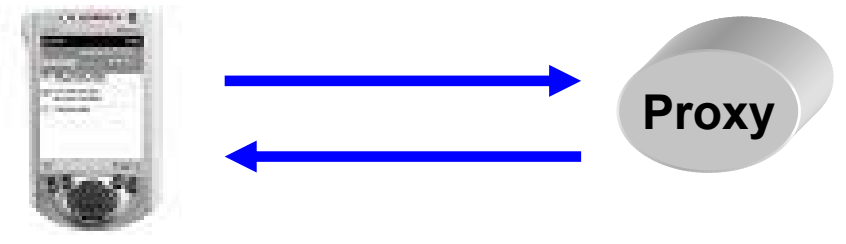
2- The UCM Module

- Developed for small devices

- Allows:

  - Selecting the intermediate proxy or a negotiation-enable server
  - Selecting the user profile
  - Client profile sending to the proxy
  - Replying to proxy request if the User client profile changes.





Content Deliverance examples

```
      03012002#HardwarePlatform" />
    <neg:DeviceType>Mobile phone</neg:DeviceType>
    <neg:DeviceName>Nokia-3310</neg:DeviceName>
    <neg:PhoneNumber>0610987326</neg:PhoneNumber>
    <neg:screen>30X23mm</neg:screen>
    <neg:display>101X52Pixels</neg:display>
    <neg:PixelStretch>1.24</neg:PixelStretch>
    <!--  composed elements are not supported until now  -->
  </rdf:Description>
 </ccpp:component>
- <ccpp:component>
 - <rdf:Description ID="SoftwarePlatform">
    <rdf:type rdf:resource="http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/NegotiationSchema/schema-
      03012002#SoftwarePlatform" />
    <rdf:type rdf:resource="SoftwarePlatform" />
    <neg:PlatformName>the platform name</neg:PlatformName>
    <neg:PlatformVersion>the platform version</neg:PlatformVersion>
  </rdf:Description>
 </ccpp:component>
- <ccpp:component>
 - <rdf:Description ID="BrowserUA">
    <rdf:type rdf:resource="http://www.inrialpes.fr/opera/people/Tayeb.Lemlouma/NegotiationSchema/schema-
      03012002#BrowserUA" />
    <neg:PlayerName>PlayerName</neg:PlayerName>
    <neg:PlayerVersion>PlayerVersion</neg:PlayerVersion>
   - <neg:OnlySupportedResources>
    - <rdf:Bag>
     - <rdf:li rdf:parseType="Resource">
        <neg:ResourceType>SMS</neg:ResourceType>
        <neg:ResourceFormat>sms</neg:ResourceFormat>
        <neg:CommunicationProvider>SFR</neg:CommunicationProvider>
```

Universal Profiling within the services delivery

- **The universal profiling allows to the content negotiation strategy to deliver adapted services.**
- **An advanced content negotiation strategy matches inputted profiles and delivers a content according to parameters included in profiles.**
- **Profiles acquisition can be done by:**
  - **Storing them (ex. documents profiles, servers methods)**
  - **Receiving them (ex. sent by devices)**
  - **Calculating them (ex. network profiles)**
- ***After profiles matching, one of the following content can be delivered:***
  - ***° The original service***
  - ***° The original service after filtering***
  - ***° An existing version***
  - ***° The service after adapting it by a server method***
  - ***° A negative reply (to avoid client blocking)***

Implications for Further Work on Delivery Context

- **We propose to define and adopt a complete universal profiling schema for the content negotiation.**

- **The universal profiling must target different parameters of the heterogeneous environment:**

  ***Client*: device description, user preferences**
  ***Services*: documents and other services**
  ***Server capabilities*: adaptation methods**
  ***Network*: characteristics, etc.**

- **The schema must be extensible and not limited to a particular kind of devices or architecture.**

- **Schemas must cover a wide range of description elements to allow developers to define their applications-related profiles**

Conclusions

- A content negotiation strategy allows -with making a best effort- a universal access
- Universal profiling definition represents an indispensable base for such strategy.
- Content authors must take into account providing services profiles to make their content accessible by different clients.
- The definition of extensible and opened schemas has a big benefit for developers in heterogeneous environments.

Thank you

Contact:
Tayeb.Lemlouma@inrialpes.fr
More information:
www.inrialpes.fr/opera/people/Tayeb.Lemlouma/index.html