Universal Profiling for Content Negotiation and Adaptation

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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)

- 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.)
The definition is based on

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

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

- Extension: Proper to the Content Negotiation  
A Profile Example

```xml
<?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#"
    Lemlouma/NegotiationSchema/ClientProfileSchema03012002#">
    <rdf:Description rdf:ID="ClientResourcesProfile">
        <ccpp:component>
            <rdf:Description rdf:about="TerminalHardware">
                <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

```xml
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>101X132Pixels</neg:Display>
<neg:PixelStretch>1.24</neg:PixelStretch>
<!-- composed elements are not supported until now -->
</ccpp:component>

- <ccpp:component>
  - <rdf:Description ID="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">
    <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>msm</neg:ResourceFormat>
          <neg:CommunicationProvider>SFR</neg:CommunicationProvider>
        </neg:li>
      </ rdf:Bag>
    </neg:OnlySupportedResources>
  </rdf:Description>
</ccpp:component>
```

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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

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