



# The technology of mobile services development

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# Why one more technology is necessary? (1)

- A lot of mobile applications (their number constantly grows)
  - iPhone (AppStore) – more than 450 000
  - Android Market (Android) – more than 500 000
  - Ovi Store (Nokia S60) – more than 50 000
- Almost all of them take data from Internet
  - Mobile versions of media websites
  - Weather
  - What restaurant, café, ATM etc is near by?



# Why one more technology is necessary? (2)

We are interested in another class of applications – *distributed mobile services*

## Specifics:

- Non-trivial server business logics
- Mobile device as a part of complicated distributed system
- «License or drive?» (Russian joke) – focus on the service functionality not on the application design
- Working always and everywhere, coverage of many mobile platforms

## Examples:

- Video surveillance translation on mobile phone
- Remote management of “smart” devices (smart house systems)
- Mobile access to distributed business applications



# Why one more technology is necessary? (3)

Technologies oriented on this class of services:

- Mobile Ajax
- Nokia Widsets (the project was closed 2 years ago)
- Similar ideas – Opera Mini (not similar aims)
- ???



# Ubiq Mobile + QReal

Our approach is based on a combination of two components:

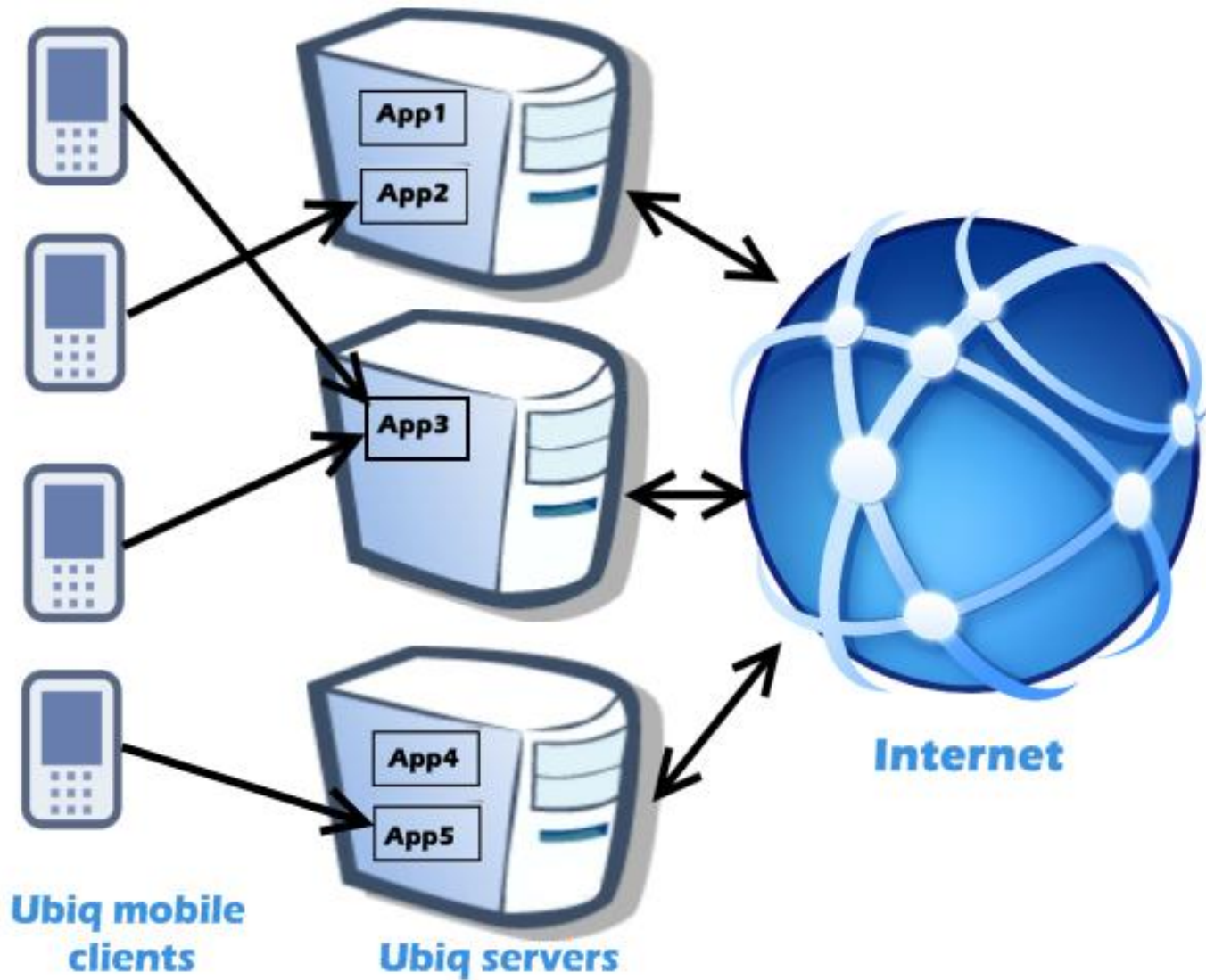
- Ubiq Mobile platform
  - Provides the reliable environment for performance of different types of services in various network infrastructure conditions
- QReal – visual meta-technology for software development
  - Allows to develop services in specialized graphic languages (DSL), adjusted for specific subject domain



# Ubiq Mobile Platform

- Universal platform with rich functionality and low requirements to resources (radio channel capacity, processor and memory capacity)
- Terminal architecture usage (applications run on .NET server, only simple actions are executed on a client part)
- Data exchange between server and client is carried through the proprietary binary protocol over TCP/IP
- Restrictions: rather static interface, impossibility of offline work; but these restrictions are insignificant for the chosen class of applications

# Ubiq Mobile Architecture





# Supported mobile platforms

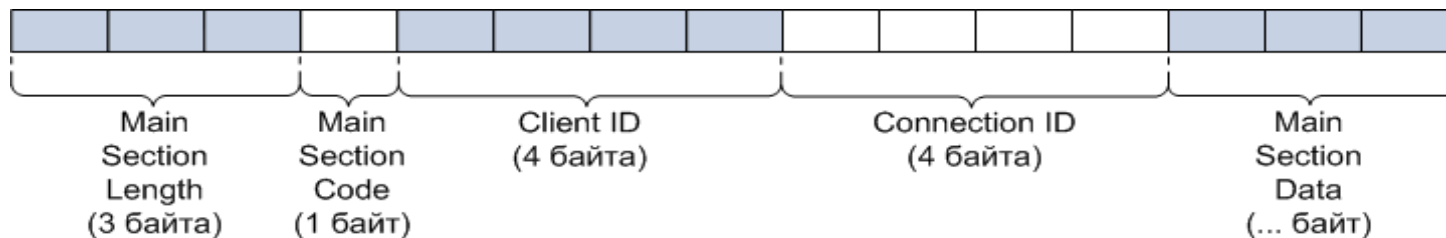
- Nokia S60
- iPhone
- Android
- Java ME (Nokia S40, Samsung, SonyEriccson etc)





# The binary terminal protocol

- Each protocol command is a tree with elements-sections containing the various data
- The section itself could contain other sections, in this case the length of covering sections will include lengths of all subsections
- Data in sections are organized in the form of sequences of fixed or variable length fields
- The protocol supports concept of data arrays which begin with the two-byte field containing quantity of elements. Then there are elements, each of them could be both fixed and variable length
- The described structure of the protocol combines compactness of binary information storage with flexibility and universality facilitating both analysis of received commands and protocol modification (by addition of new sections and subsections)





# Ubiq Mobile Applications

- Applications – separate Microsoft.NET builds, dynamically loaded on Ubiq Mobile server and executed in Ubiq Mobile environment
- 2 types of applications – user applications and applications-services
- Interface with mobile clients – 3 modes:
  - Basic Terminal – exchange of image parts through a virtual canvas
  - Native Terminal – exchange of controls tree parts
  - Native (for thick clients on advanced mobile platforms) – interaction through asynchronous messages
- Access to external world through the set of APIs



# Ubiq Mobile APIs' examples

- **Graphics API**
  - Basic API for user interface implementation
- **Extended Graphics API**
  - Advanced Silverlight-like API for user interface implementation
- **MessagingAPI**
  - API for components of the distributed application implementation through messages
- **GMapAP**
  - API for access to Google Maps services
- **SNetAPI**
  - API for access to social networks
- **etc.**



# Domain/application classes

- Mobile interfaces to business applications
- Information interactive online services
- Remote management of “smart” devices
- Multiuser games
- Services showing different information on the map



# Use of graphic software development technologies

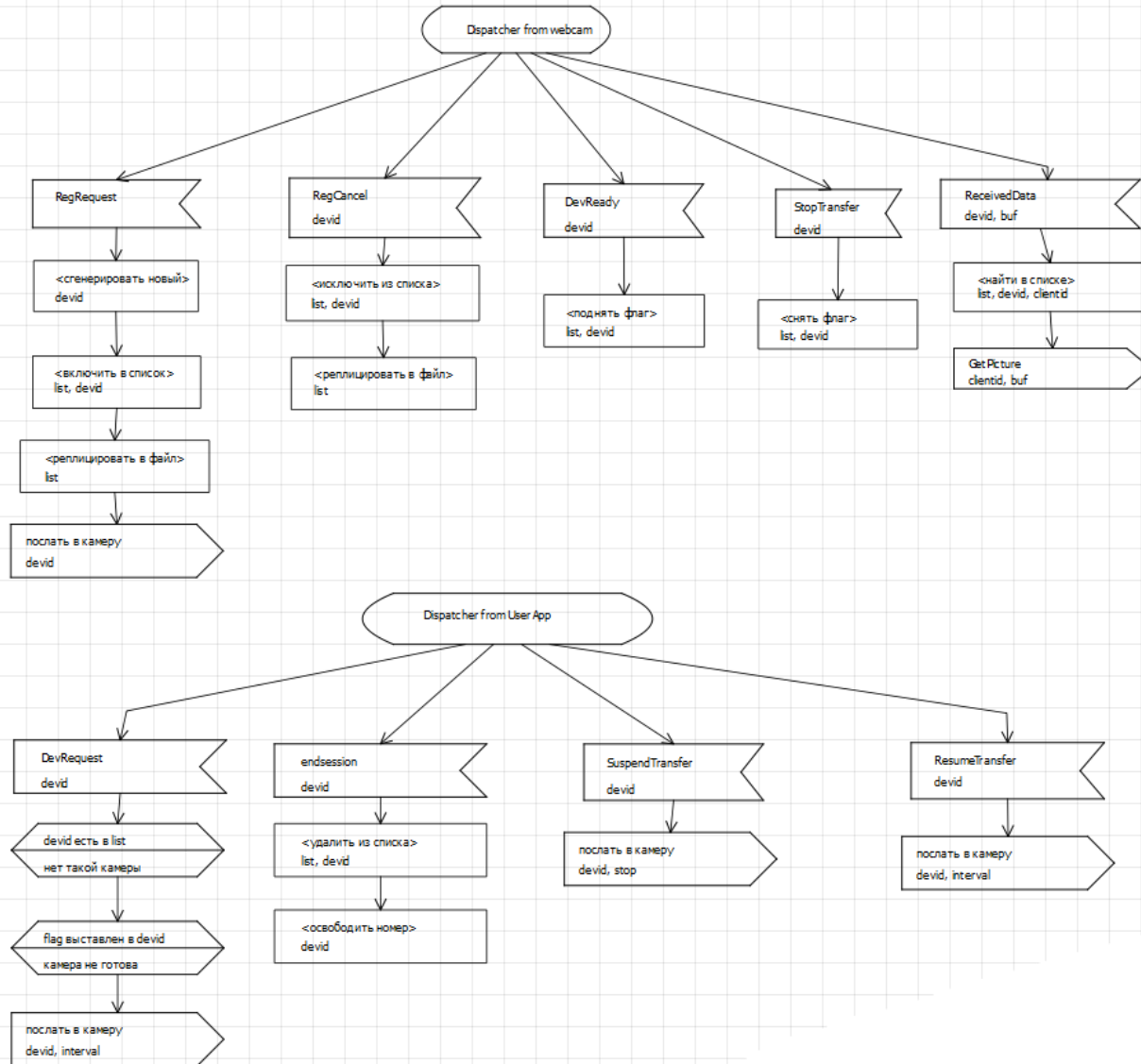
- DSM (Domain Specific Modeling) approach has gained increasing popularity last years. This approach uses specialized graphic languages (DSL), which allow laconically and visually describe behavior algorithm for projected system in some specific subject domain
- There are some new meta-technologies allowing to simplify realization of concrete DSL
- Graphic technology QReal is created on Software Engineering Chair of Saint-Petersburg State University. This technology includes some possibilities of meta-technology
- We decided we should develop our own DSL for mobile application development



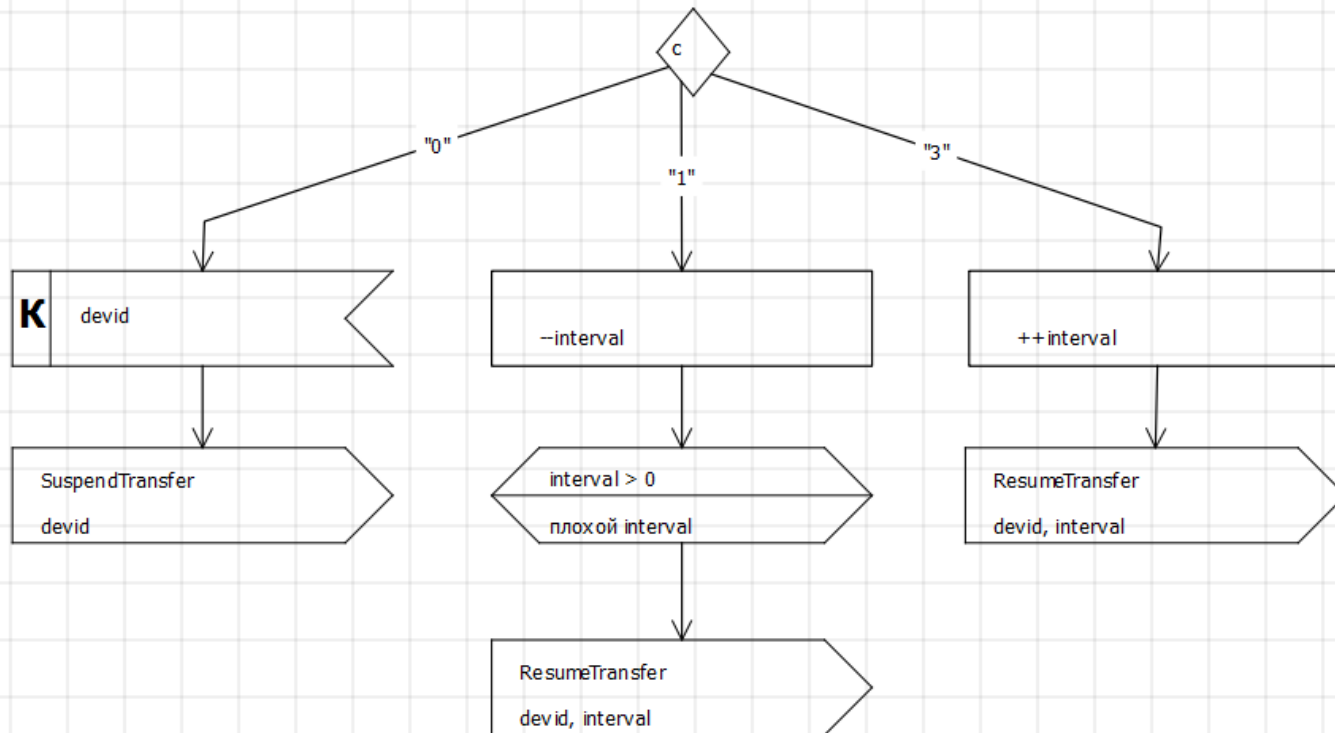
# Application example

- There is an object protected with videocameras
- User wants regularly looking images transferred from these cameras
- Video stream transfer is rather expensive but it's possible to transfer separate pictures each 2-3 seconds
- Video surveillance applications consists of several objects (UserApplication), connected with mobile devices by our protocol and the object responsible for communication with videocameras by TCP/IP protocol (Dispatcher)

# Dispatcher

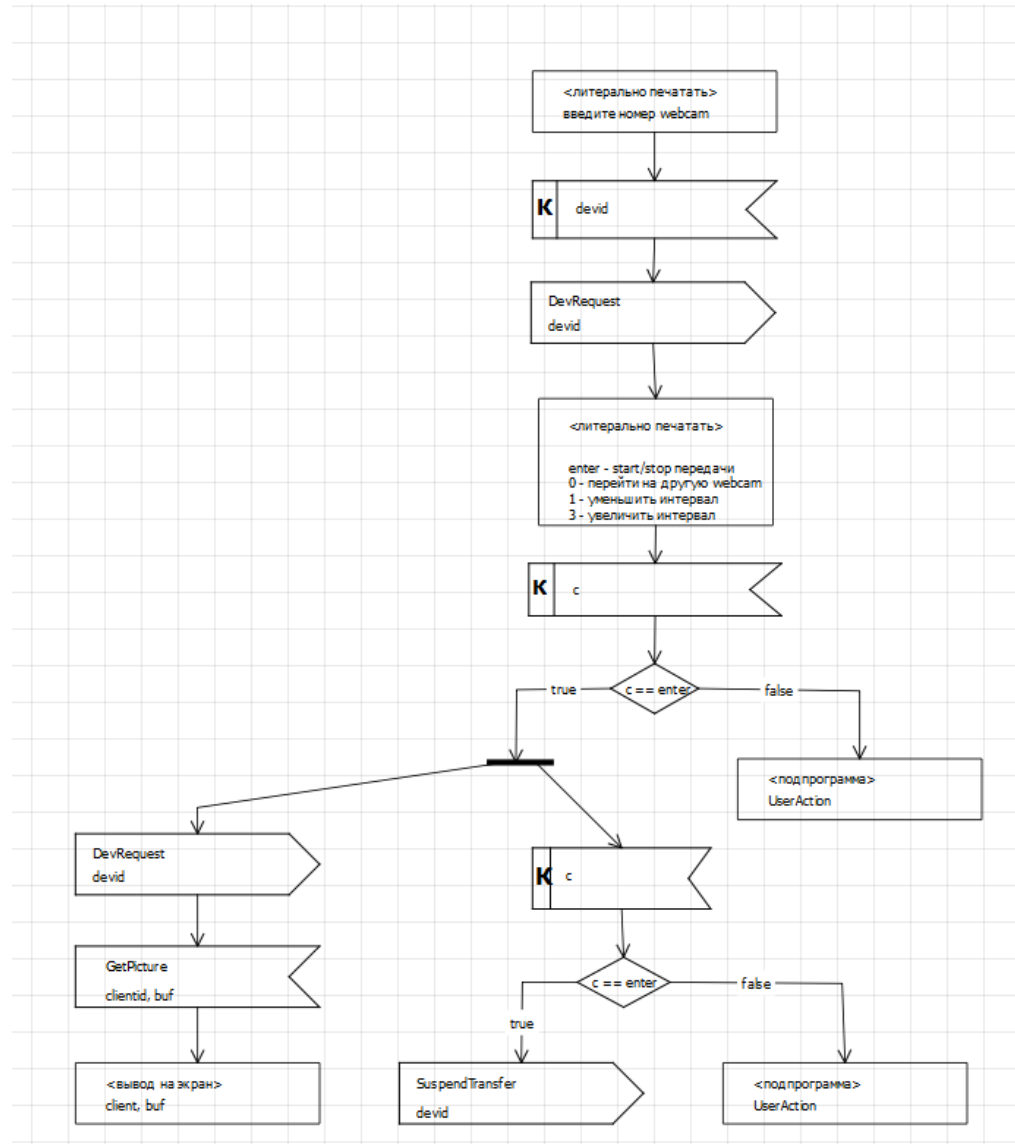


# User Action





# User Application





# Conclusion

- The DSM-approach which is not popular in the area of traditional software development could be extremely effective in the development of mobile services
- Ubiq Mobile Platform, which is used as run-time platform for DSL, provides a high performance level and reliability of created applications, and API structure of Ubiq Platform allows to simplify application code generation from DSL diagrams
- The combination of DSM-approach with the usage of highly effective platform Ubiq Mobile will give qualitatively new result, raising availability of modern mobile services to users and simplifying these services development by “usual” programmers