



Petrozavodsk State University
Department of Computer Science



Dmitry Korzun, Sergey Marchenkov,
Andrey Vdovenko, Andrey Borodulin

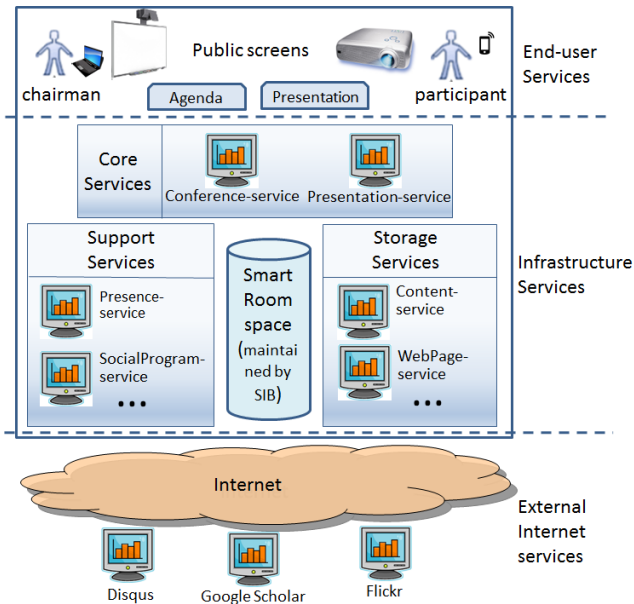
Performance Evaluation of Smart-M3 Applications: A SmartRoom Case Study

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SmartRoom System



Performance Challenge

SmartRoom represents a wide class of smart spaces based applications for creating collaborative work environments

Performance evaluation of three important SmartRoom components:

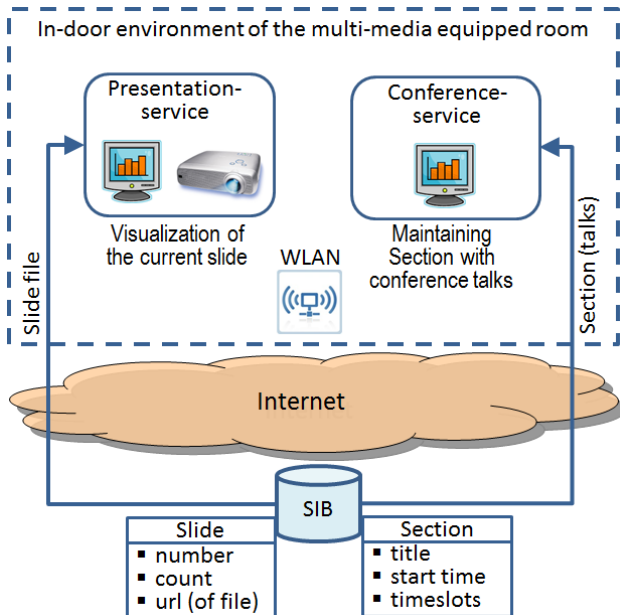
- local construction of the core SmartRoom services
- access of personal mobile devices to the system
- use of services composed with external resources

Experimental study for analyze the capacity of the Smart-M3 platform for this class of smart spaces based applications

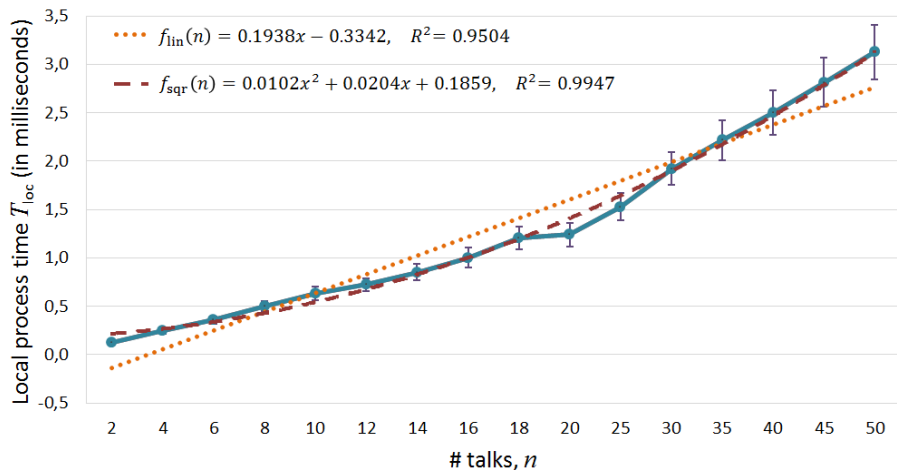
Testbed for Experiments

SIB server machine	CPU Intel Xeon, CPU E5-2630 2.30 GHz, RAM 4 Gb, HDD 36 Gb
Local computers with Wi-Fi access	CPU Intel Core, CPU 2.30–2.50 GHz, RAM 8Gb
WLAN in the testbed room	CPU Broadcom BCM5300, RAM 256Mb, WLAN-adapter: Broadcom BCM43xx 802.11b/g/n, Internet access, download speed from SIB server: 20.85 Mbps, DD-WRT firmware
Internet access from WLAN to SIB server	Download speed from SIB server: 20.85 Mbps, RTT to SIB server: 4.5 ms
Internet access from WLAN to external Internet services	Download speed from remote Internet servers: 0.81 Mbps, RTT to external servers: 12 ms

Core SmartRoom Services

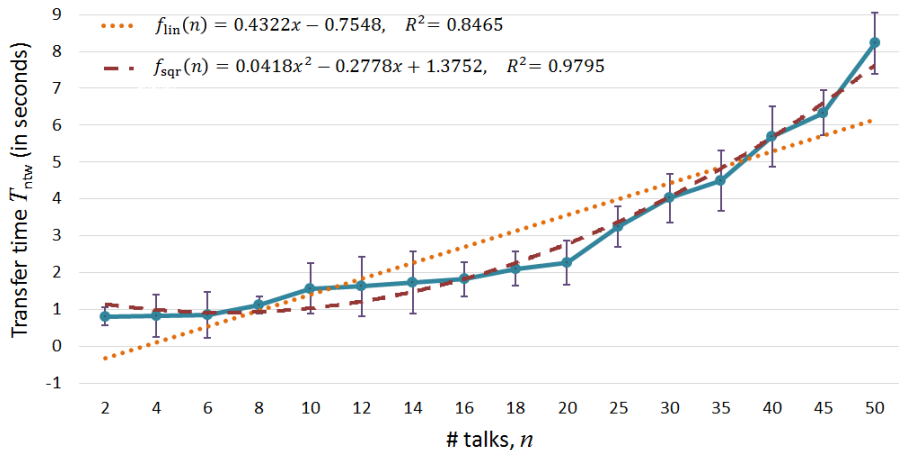


Processing n -talks section with Core Service



Time $T_{loc}(n)$ is close to linear with growth of the number of talks.

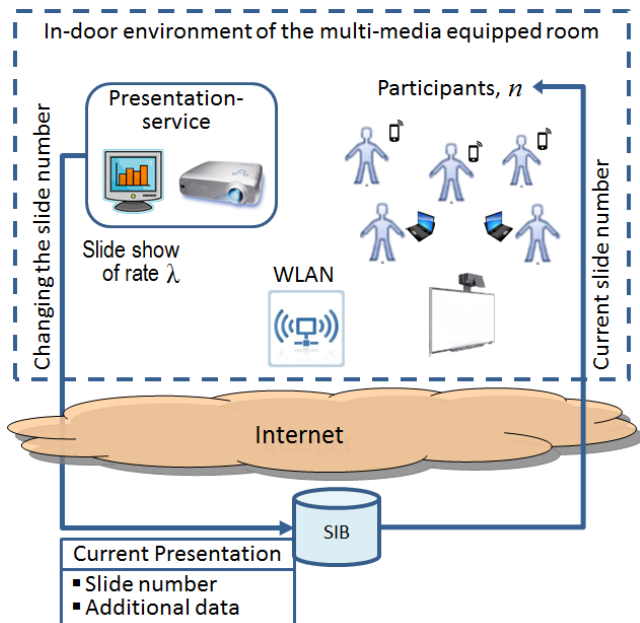
Receiving n -talks section from SIB to the Core Service



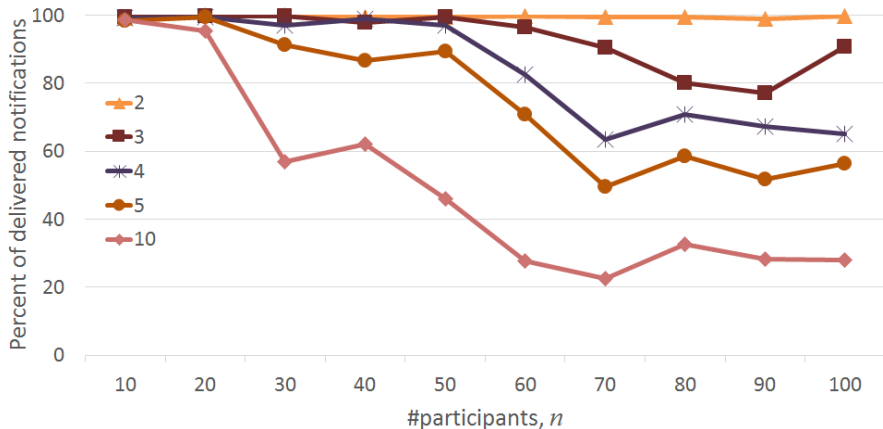
Non-linear growth of time $T_{ntw}(n)$ with increasing number of talks.

SPARQL query usage for solving performance leak issue.

Mobile access of n participants to services

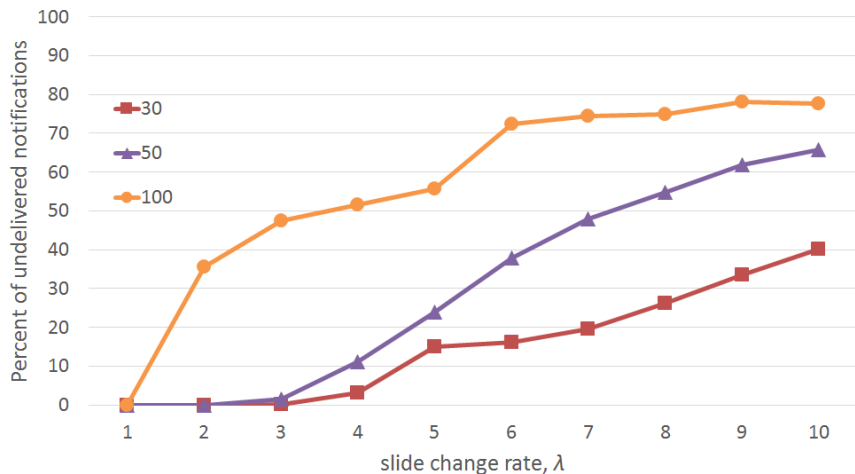


Success of notification delivery to n participants



Growth of n (the number of participants) or λ (slide change rate) reduces the share of successfully delivered notifications.

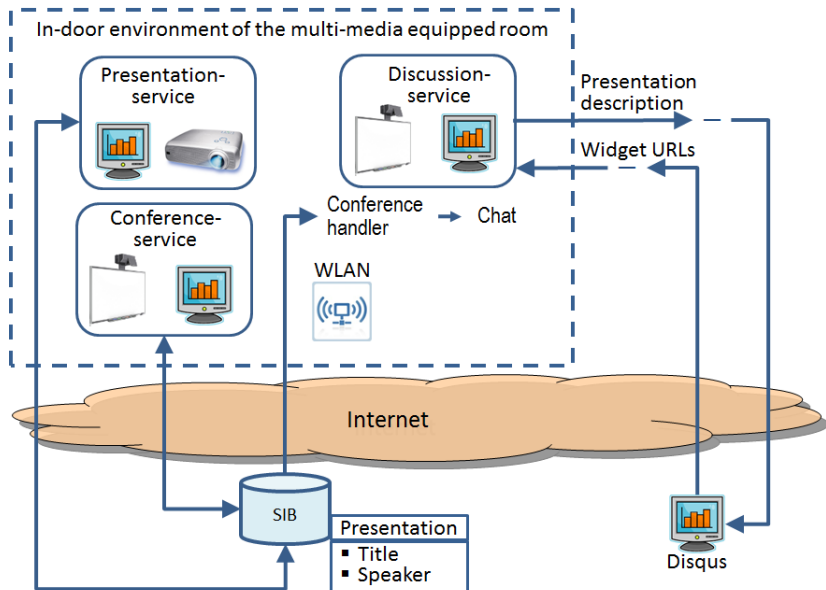
Lost notifications in dependence on change rate λ



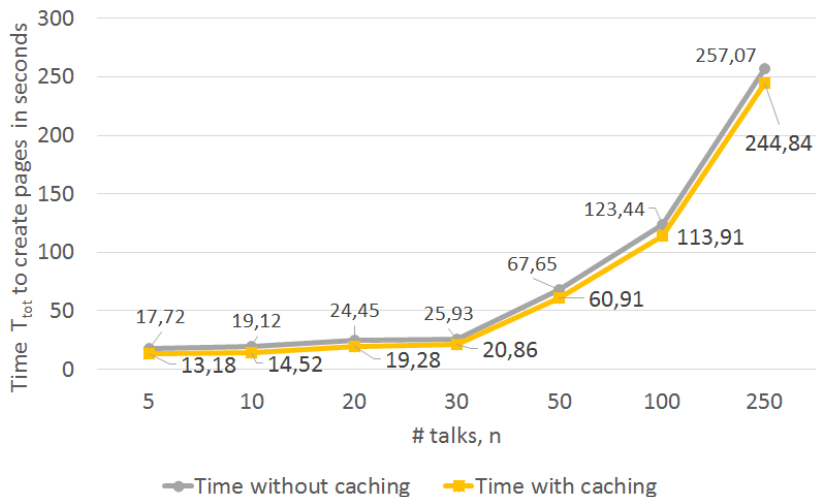
Each curve is for different number of participants (mobile clients).

High slide change rate easily leads to unacceptable notification losses.

Use of External Services



Time for creating a web page for n talks



From linear behavior for section with up to $n \leq 30$ talks, to several minutes in stress cases ($30 < n \leq 250$ talks).

Conclusion

- Studied SmartRoom system represents a wide class of smart spaces based applications
- Experiments for performance evaluation of smart spaces based application:
 - ▶ Operations in construction of the core services,
 - ▶ Notification losses in access of personal mobile devices,
 - ▶ External Internet services usage for composing services.
- The latest releases of Smart-M3 are able to provide suitable performance for smart spaces based applications.

Thank you for attention

E-mail: boroduli@cs.karelia.ru