8th Symposium on Location-Based Services

A 3D Touristic Guide on Mobile Devices

Vienna (Austria), 21-23 November 2011

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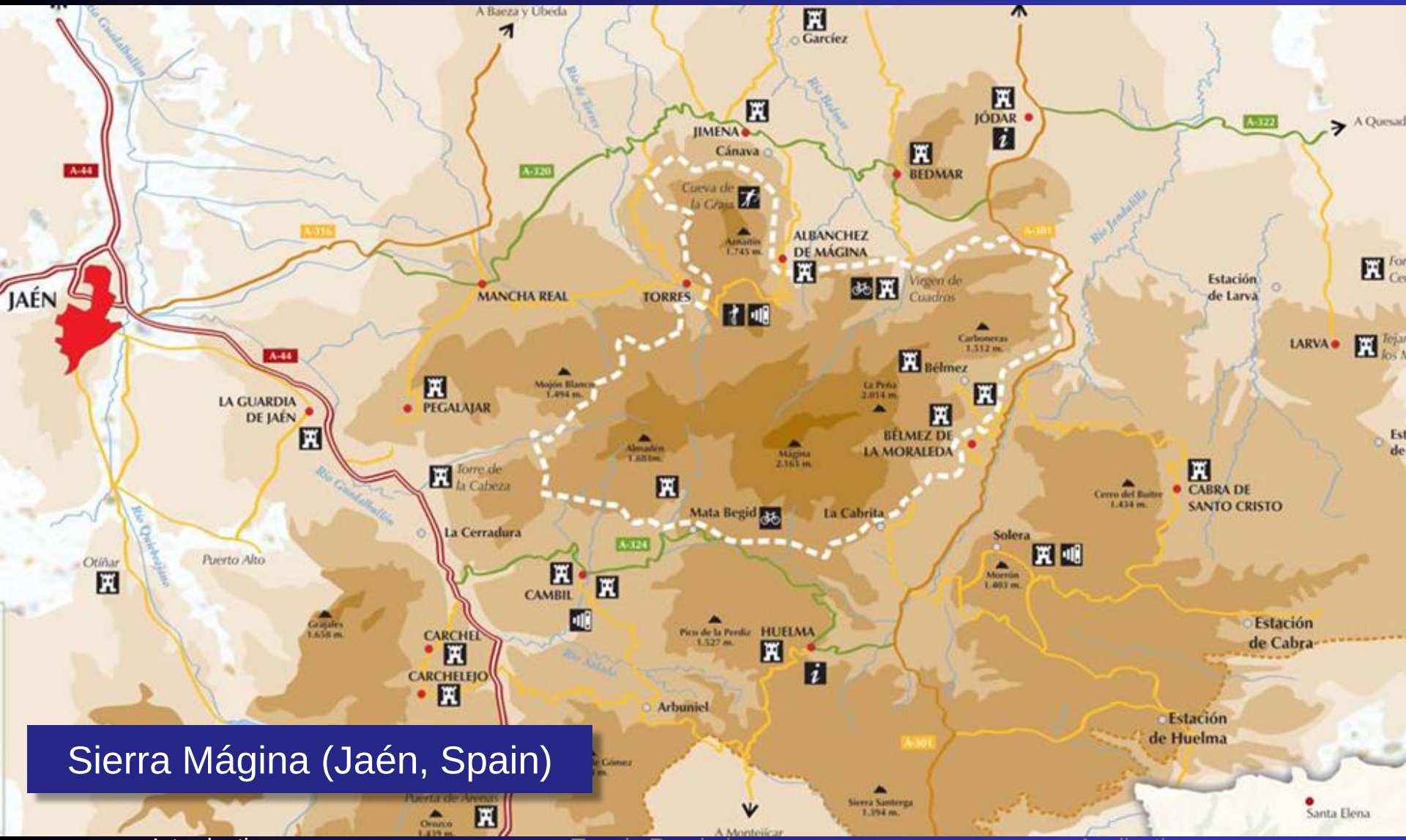
2D Maps



Sierra Mágina (Jaén, Spain)

3D Maps

Sierra Mágina (Jaén, Spain)

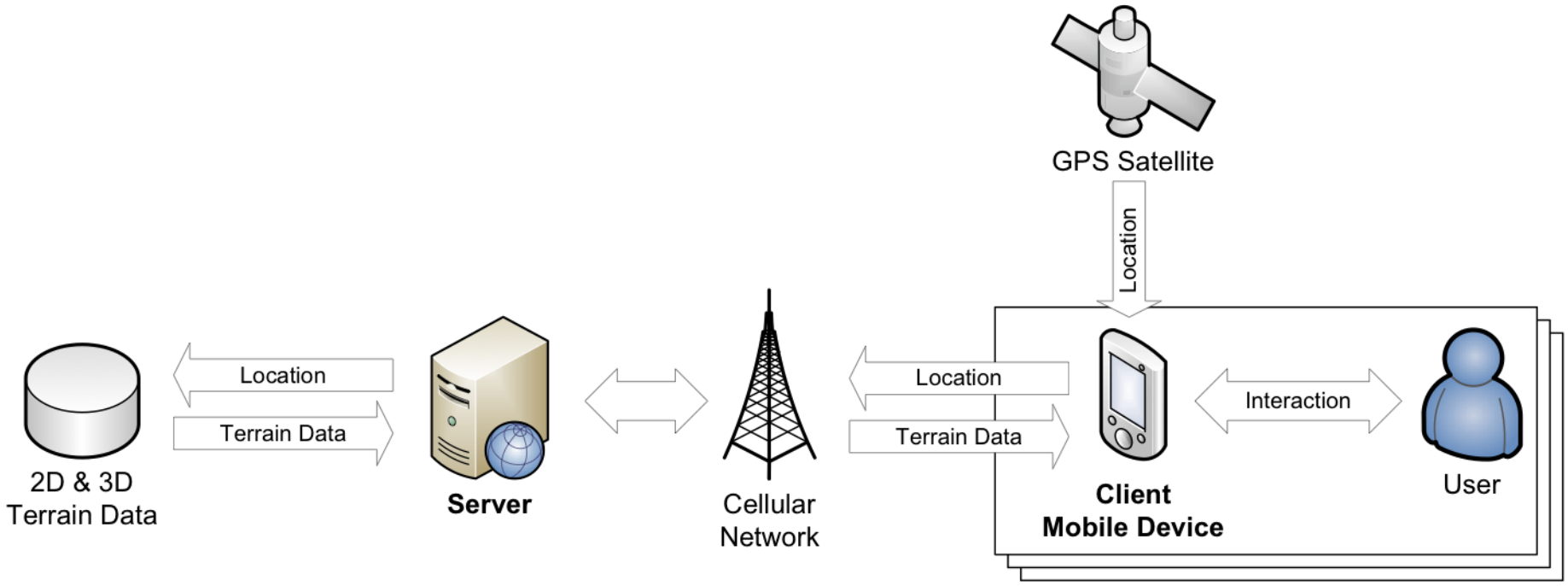
Goals

Goals

- Challenge: to develop techniques for streaming and rendering large terrains on mobile devices.
- Exploit the unique features while tackling their limitations.
- Apply this knowledge to the development of applications in the field of cultural heritage.

Software Architecture

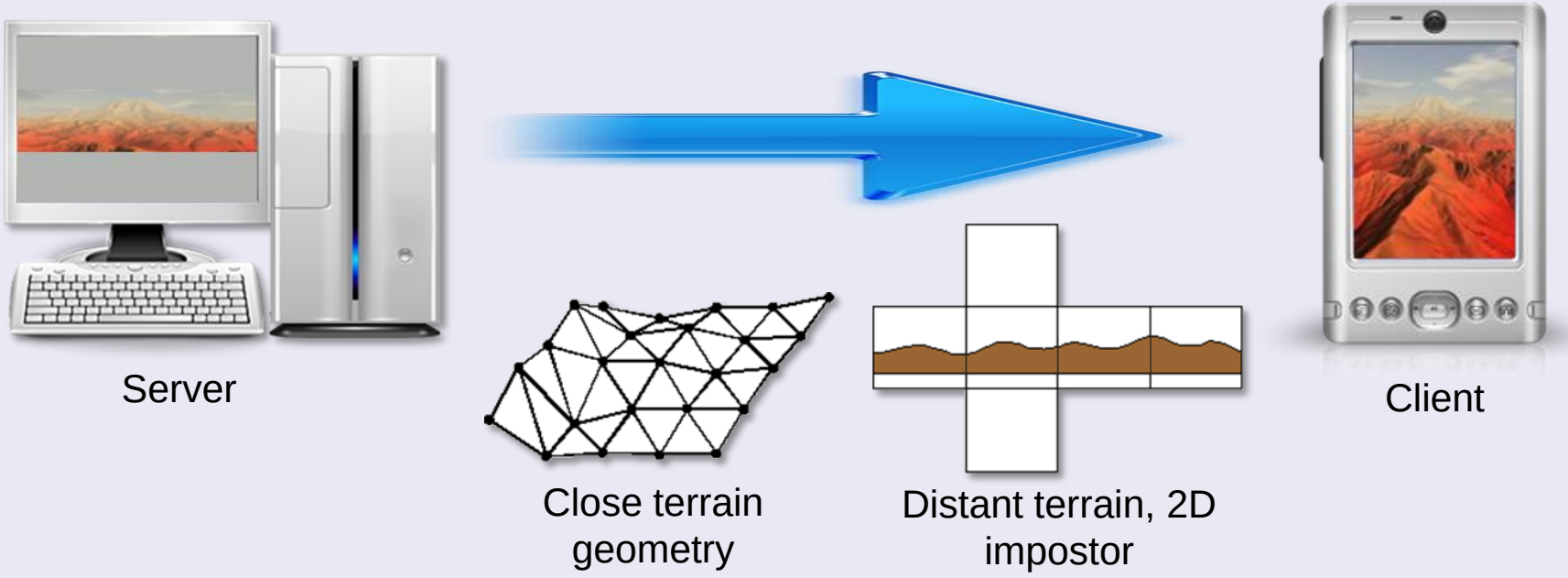
Client-server architecture



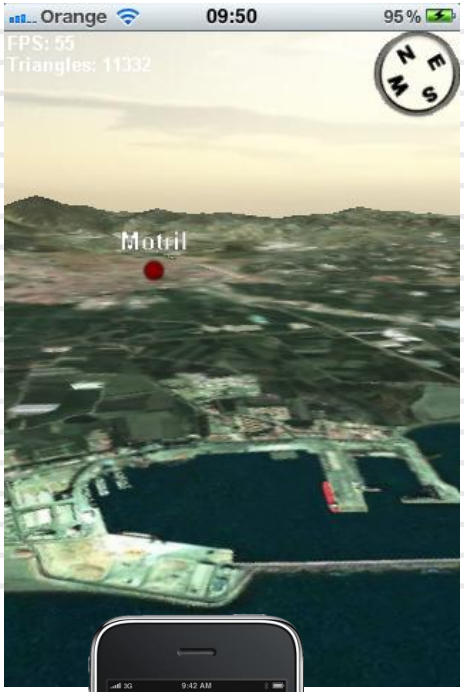
Concept

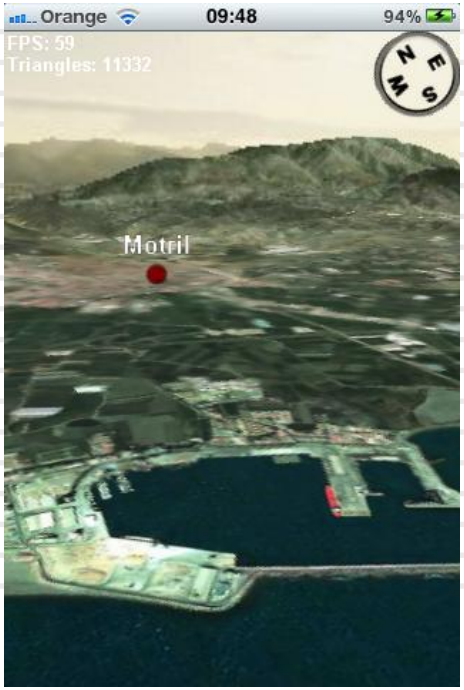
- The rendering of the 3D map is split between the remote server and the client.

Our Proposal



Concept





Images rendered by a **Nokia N95**

Images rendered by an **iPhone 3GS**

Applications: Let's use this technology!

3D guides for e-tourism

Basis for the development of location-based apps.

Promotion of cultural heritage

Studying and contextualizing cultural heritage.

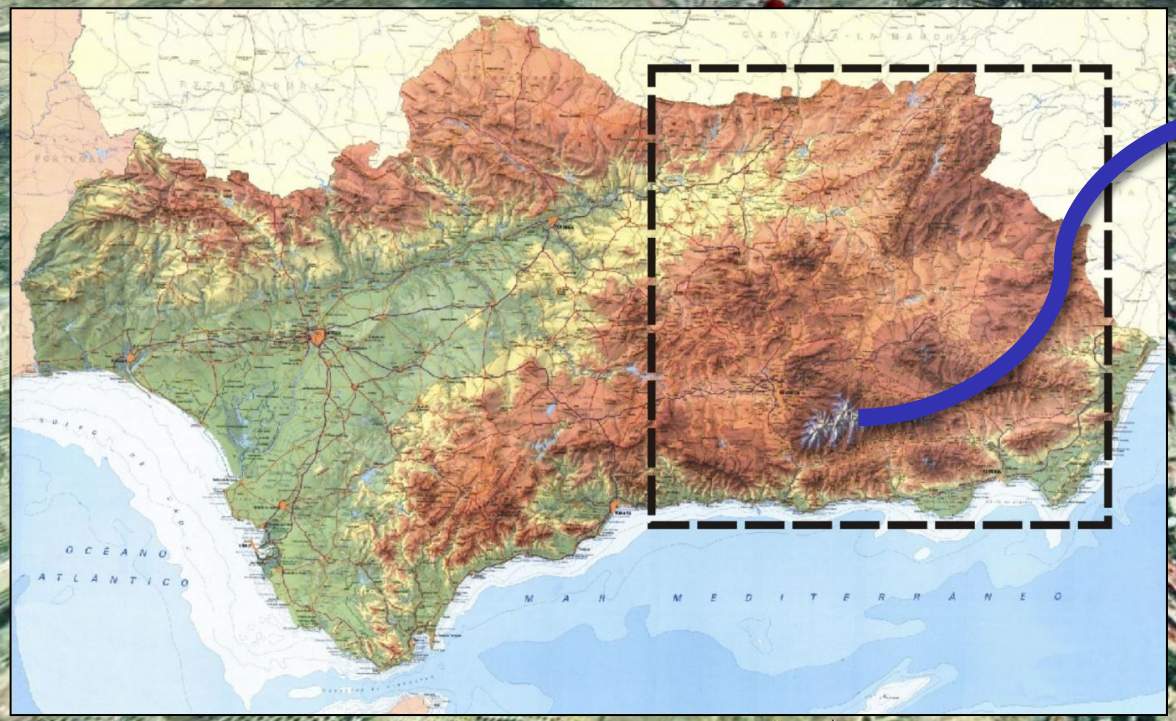
Preview trekking routes

Aerial virtual visits.

3D navigation helps users to understand the zone.

First step

- Store eastern Andalucía dataset in our server.
  - 41 943 km^2, 10m resolution.
- Provides an immersive and realistic 3D visualization of natural environments.



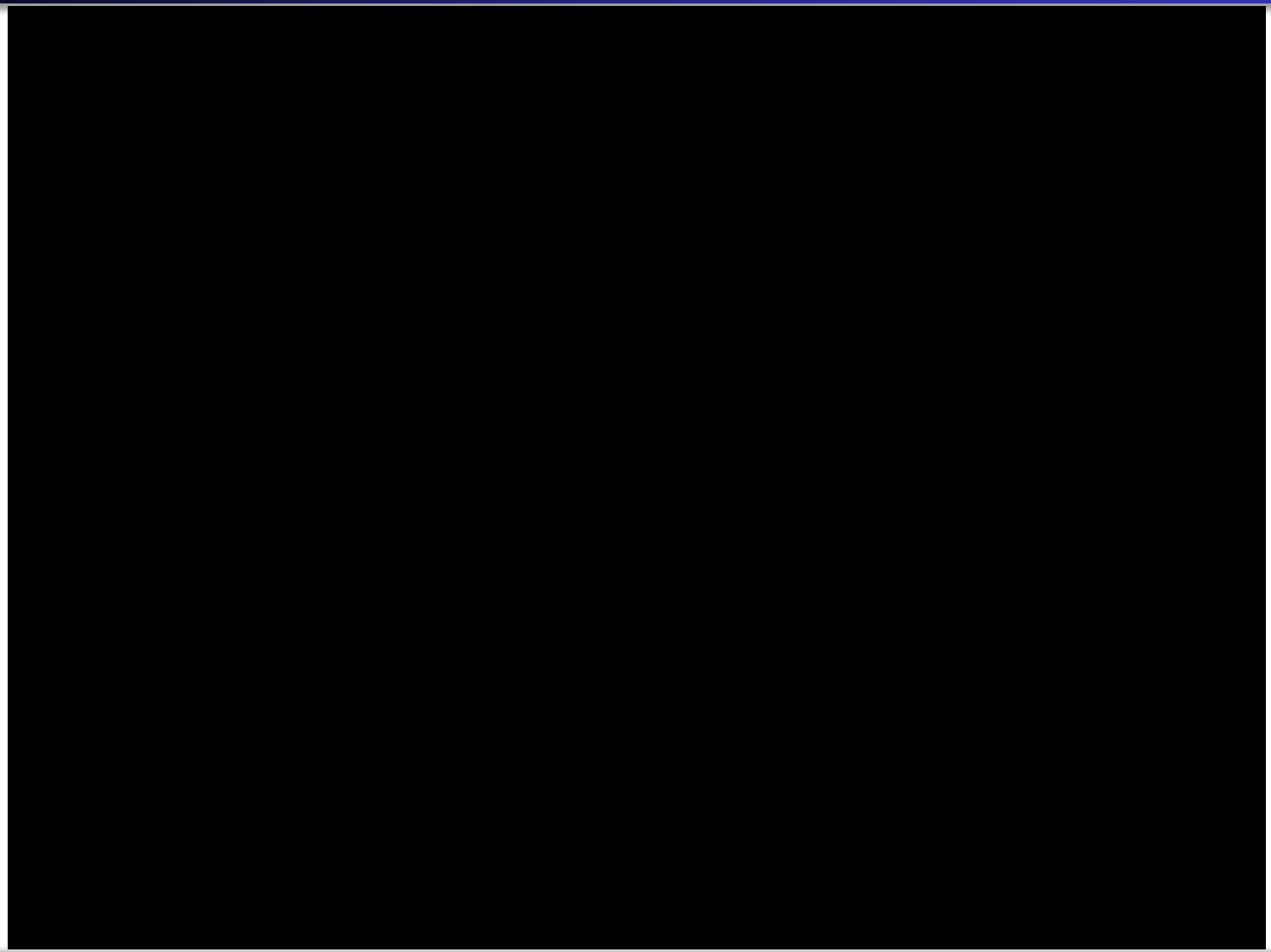
Applications: Mobile 3D Guides

Next step

- Populate this 3D world with natural and cultural real world entities.
- Promote and contextualize cultural heritage.
- According to user's location and line of sight.
- Tourists would be able to place their selves and the entities in an intuitive, direct way.

Applications: Mobile 3D Guides

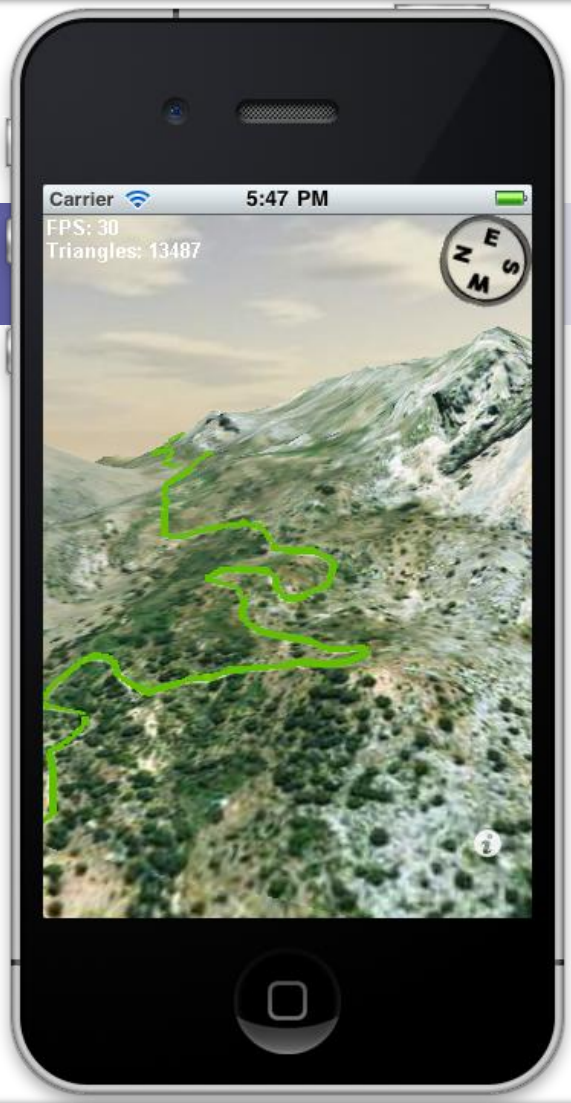
Applications: Mobile 3D Guides



Future Works

We are currently working on…

- Adding vector Information.
- Previewing trekking routes in 3D.



Thank you for your attention!

Contact info:

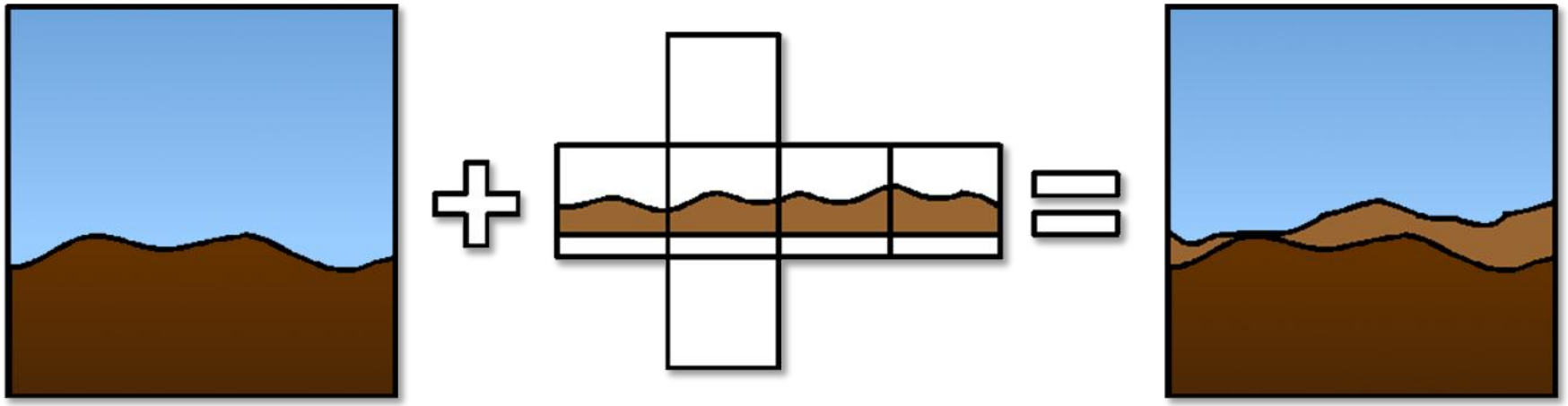
http://wwwdi.ujaen.es/~jnoguera/

Extras


Valdepenas de Jaen
Jabalcuz (1618)
Fuensanta de Martos
Martos
Villares (Los)
Jamilena
Castillo Santa Catalina
Jaen

Concept

Synthesis of the **nearby terrain** (rendered in real time by the client), and the **distant terrain** (rendered on demand by the server).



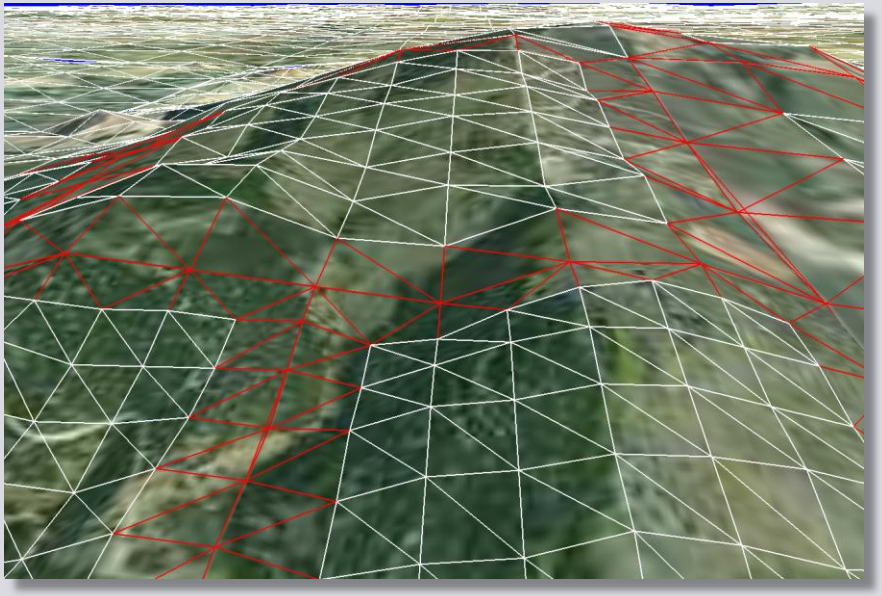
Nearby terrain

Distant terrain

Image shown to user

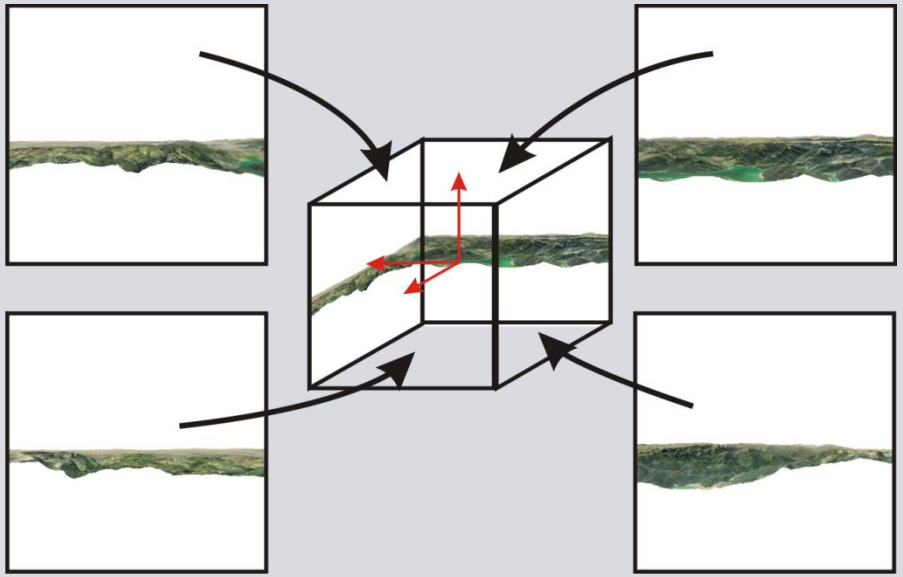
Visualización Híbrida

Terreno Cercano



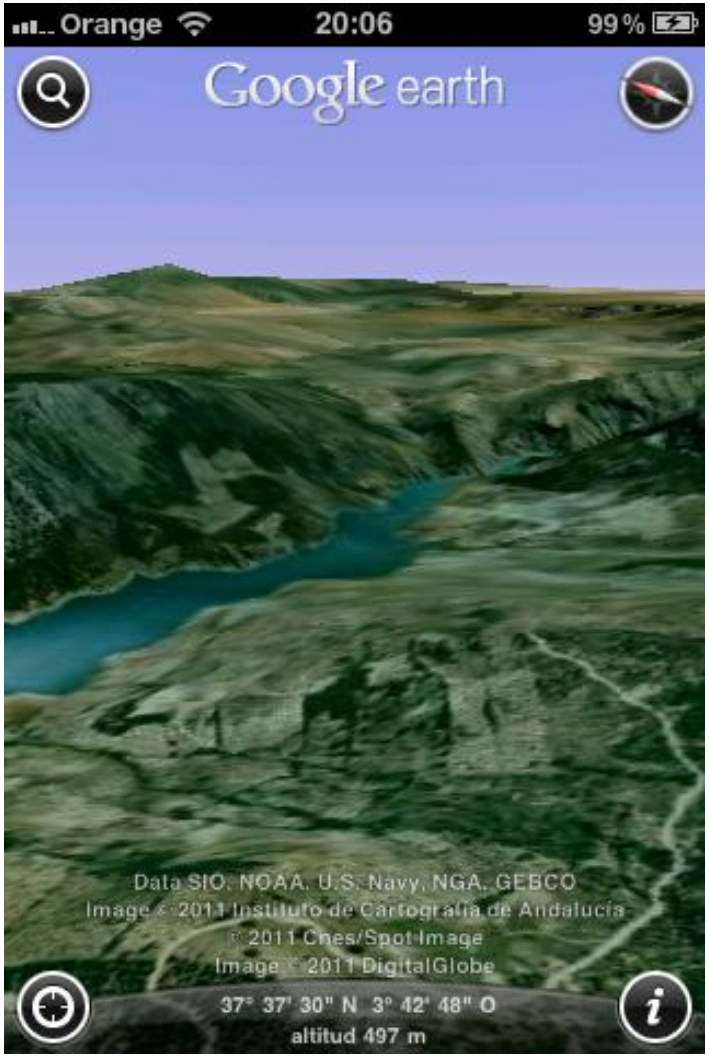
- Geometría 3D.
- Descargado y dibujado en tiempo real por el dispositivo móvil.

Terreno Lejano

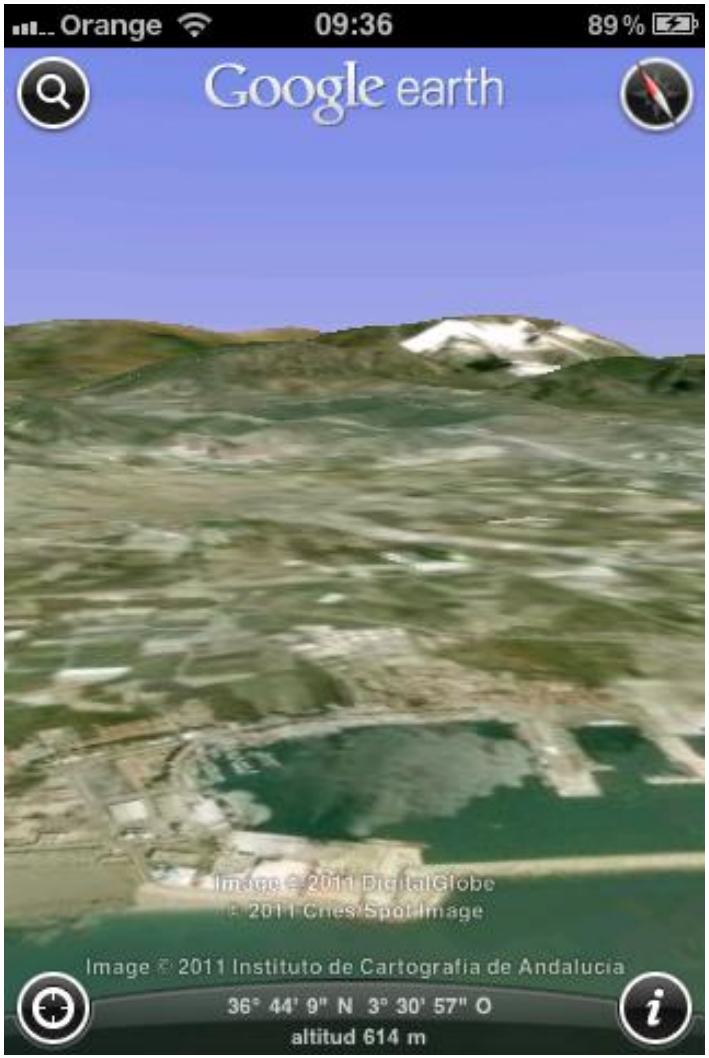


- Impostor (mapa de entorno 2D).
- Dibujada por el servidor bajo demanda.

Comparación visual con Google Earth



Comparación visual con Google Earth



Video. iPhone 3GS

Concept

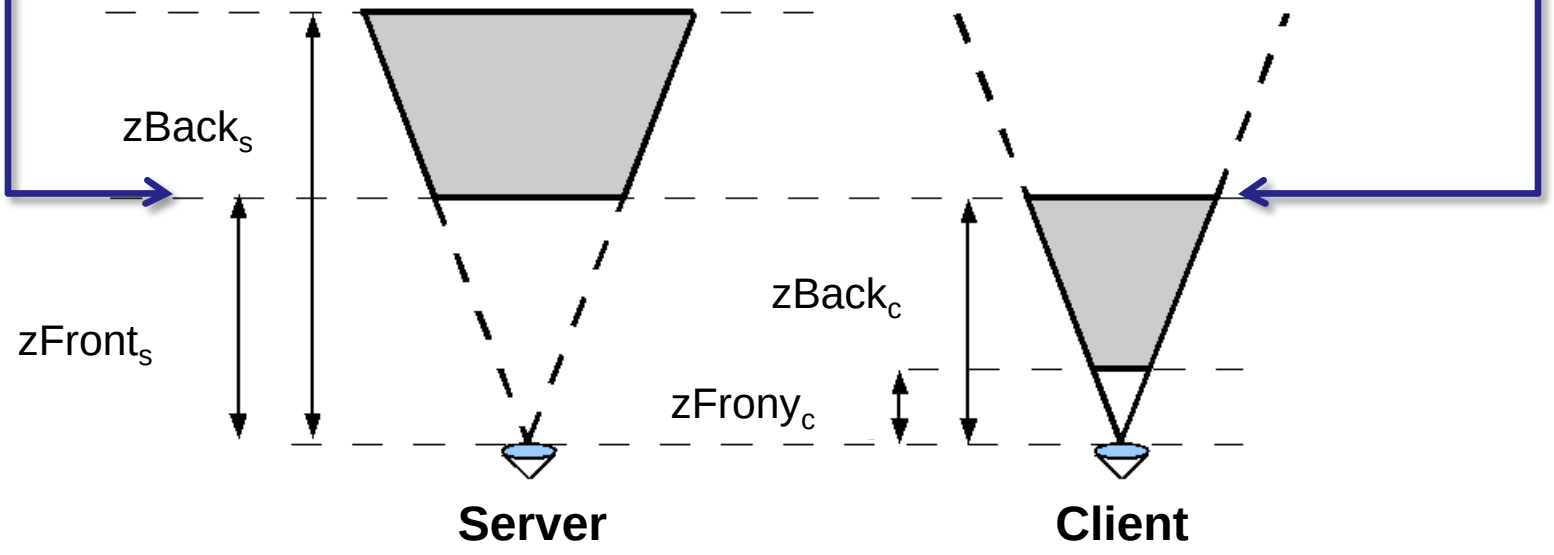
$zFront_s$

Distance to the server's front clipping plane.

Both planes are coincident

$zBack_c$

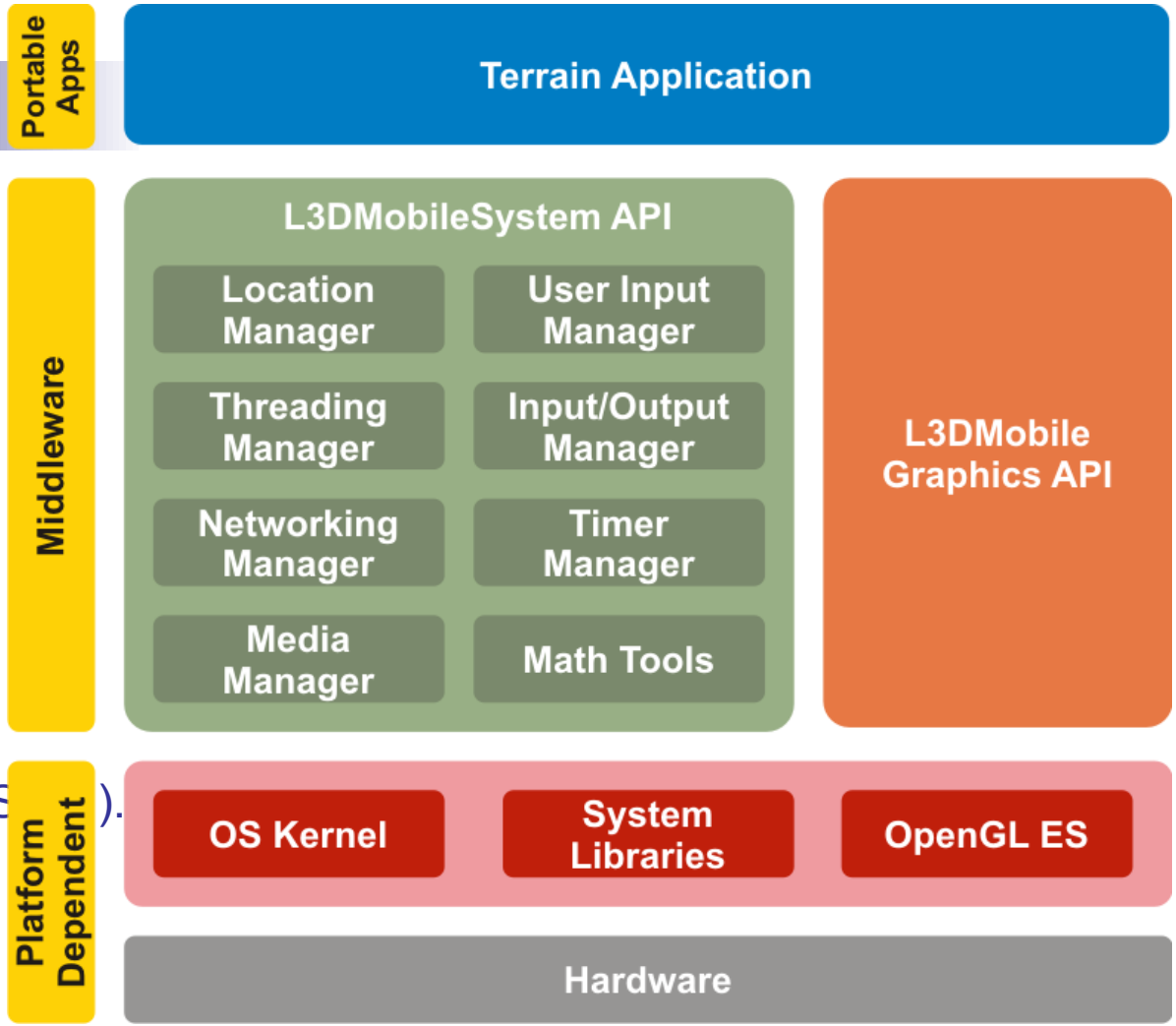
Distance to the client's back clipping plane.



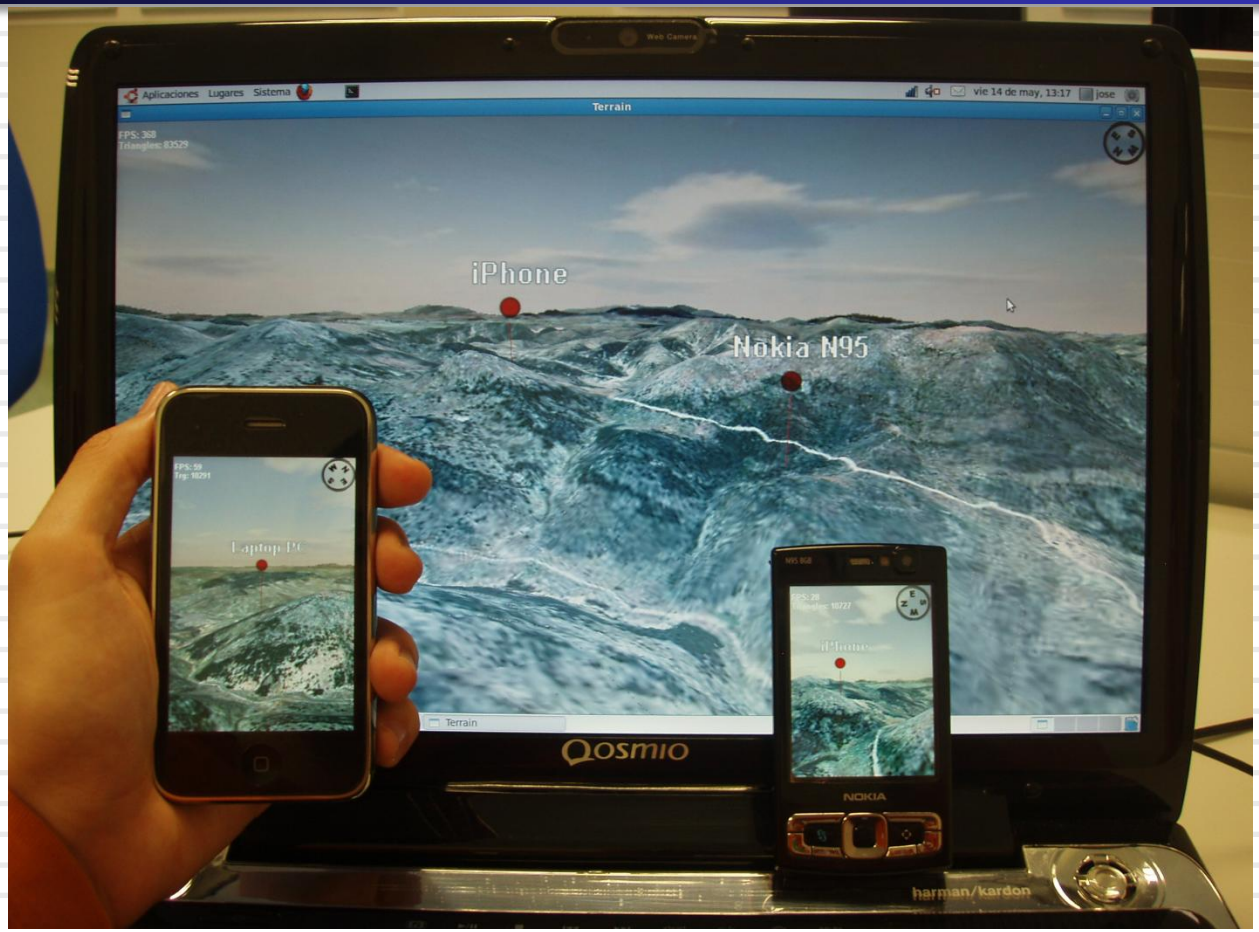
Fighting the Fragmentation

Multiplatform

- Abstraction layer.
- Platforms:
  - iOS.
  - Symbian.
  - WinMobile
  - Win32,
  - POSIX (Linux, MacOS).



Fighting the Fragmentation



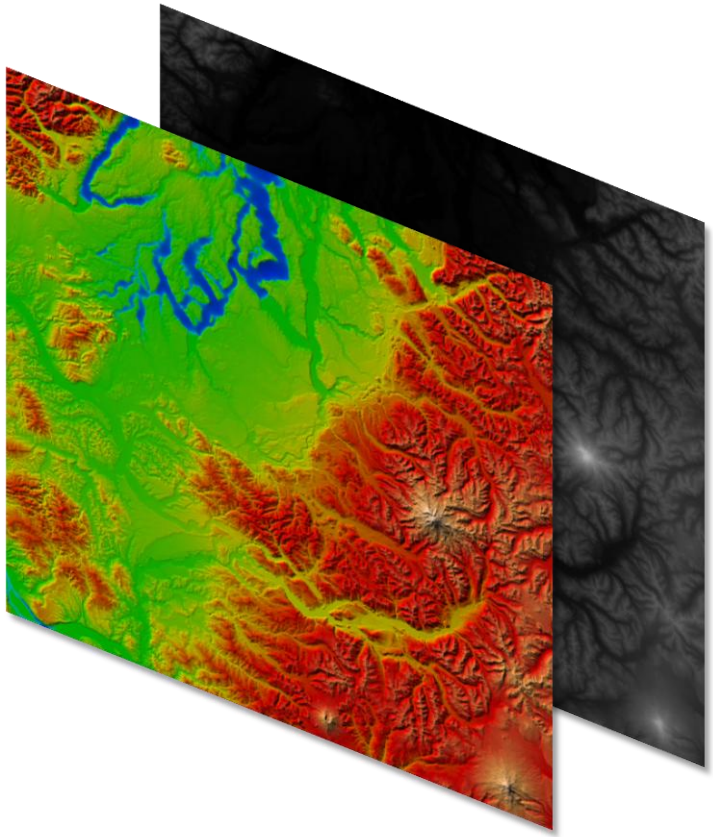
- A multiuser session involving a **laptop PC**, an Apple **iPhone 3GS** and a **Nokia N95** connected to the same server

Resultados

- 300 seconds flyover following a rectilinear trajectory.
  - Constant height of 100m over the terrain.
  - Constant speed.

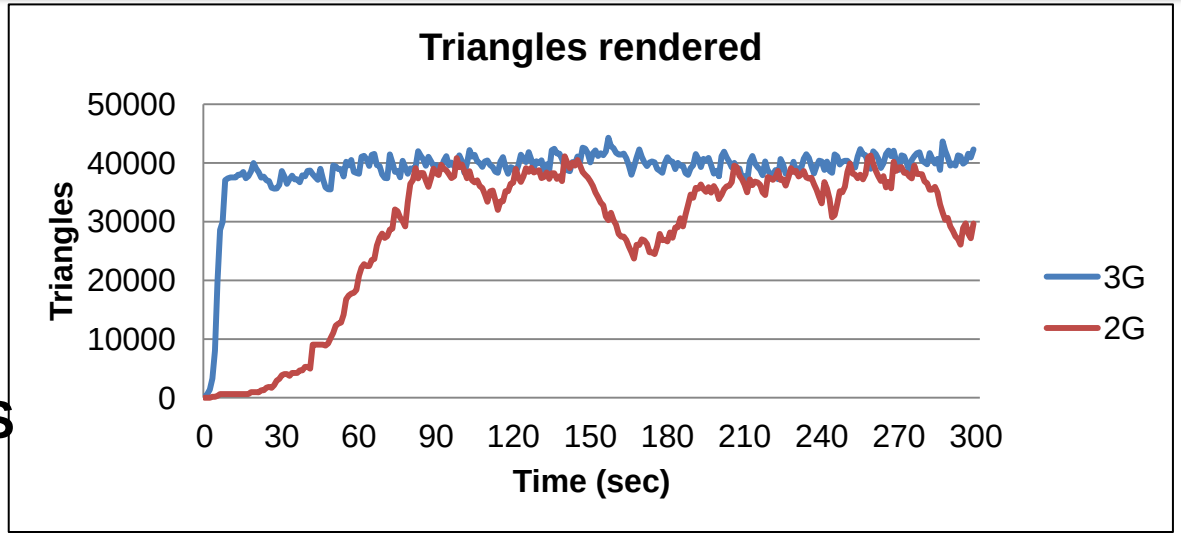
- Panoramas:
  - 7.5 km from the viewer.
  - Min viewing distance: 30 km.
  - Max error: $\varepsilon = 5\%$.
  - Resolution: 256^2 pixels.

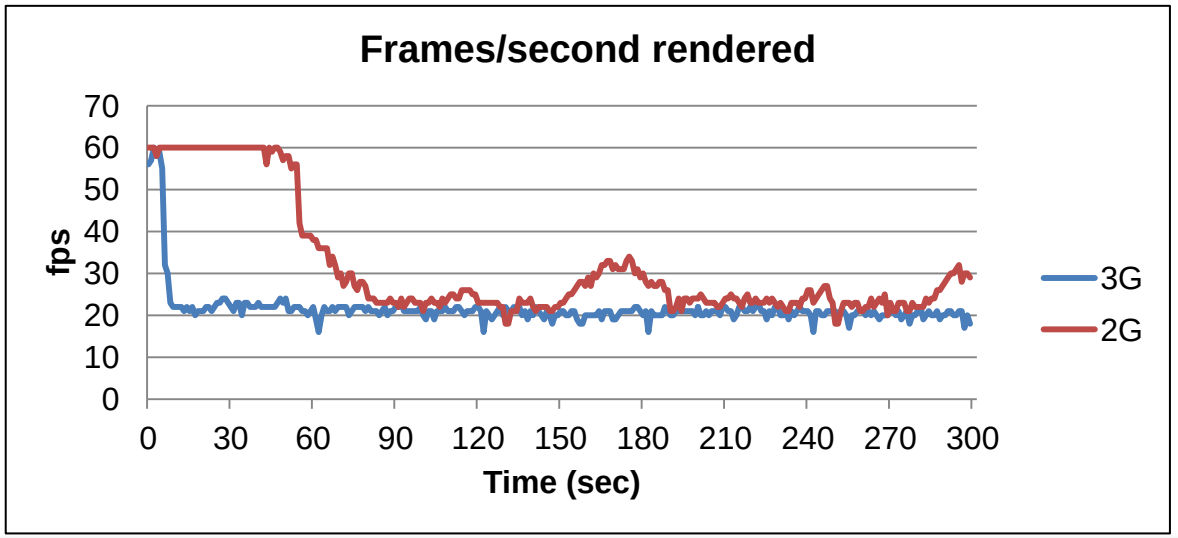
- Puget Sound dataset:
  - 16384 x 16384 height values.
  - Resolution: 10 m.



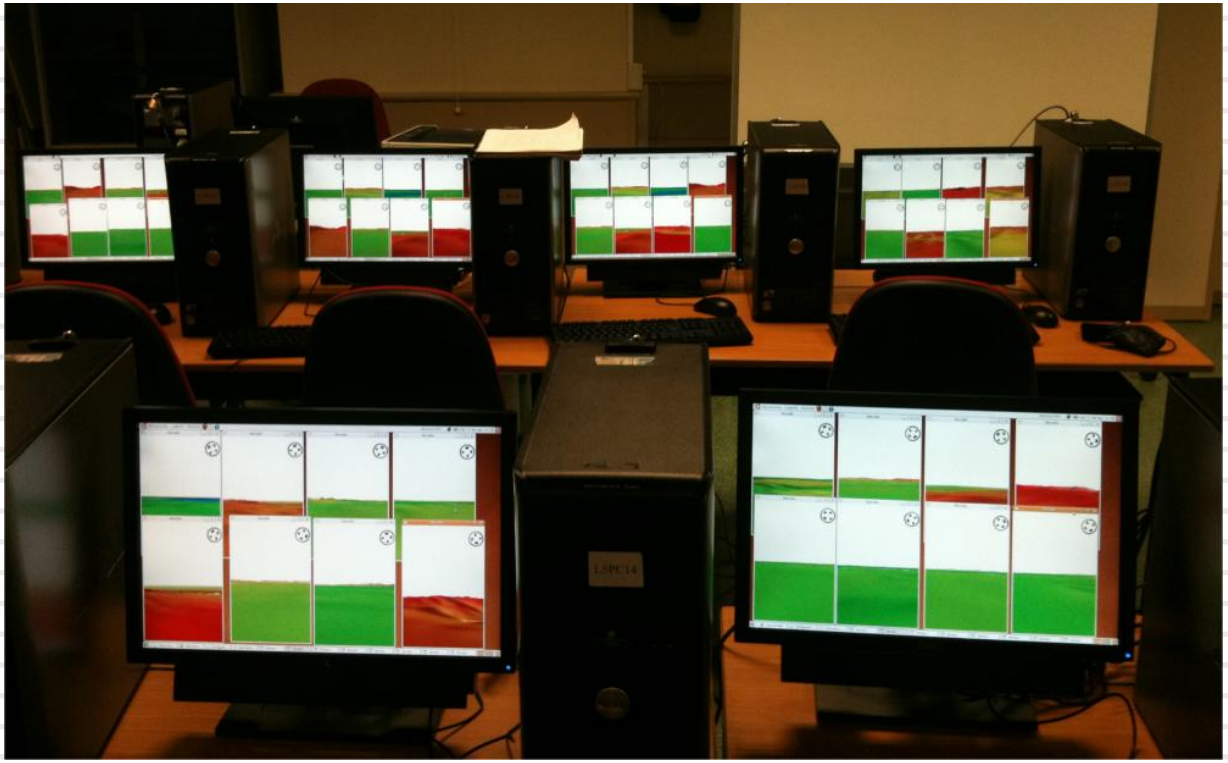
Results: Performance

- **hone 3GS**
- **0 km/h**
- Networks:
  - **UMTS** (3G)
  - **GPRS** (2G)





Results: Scalability



Commodity server

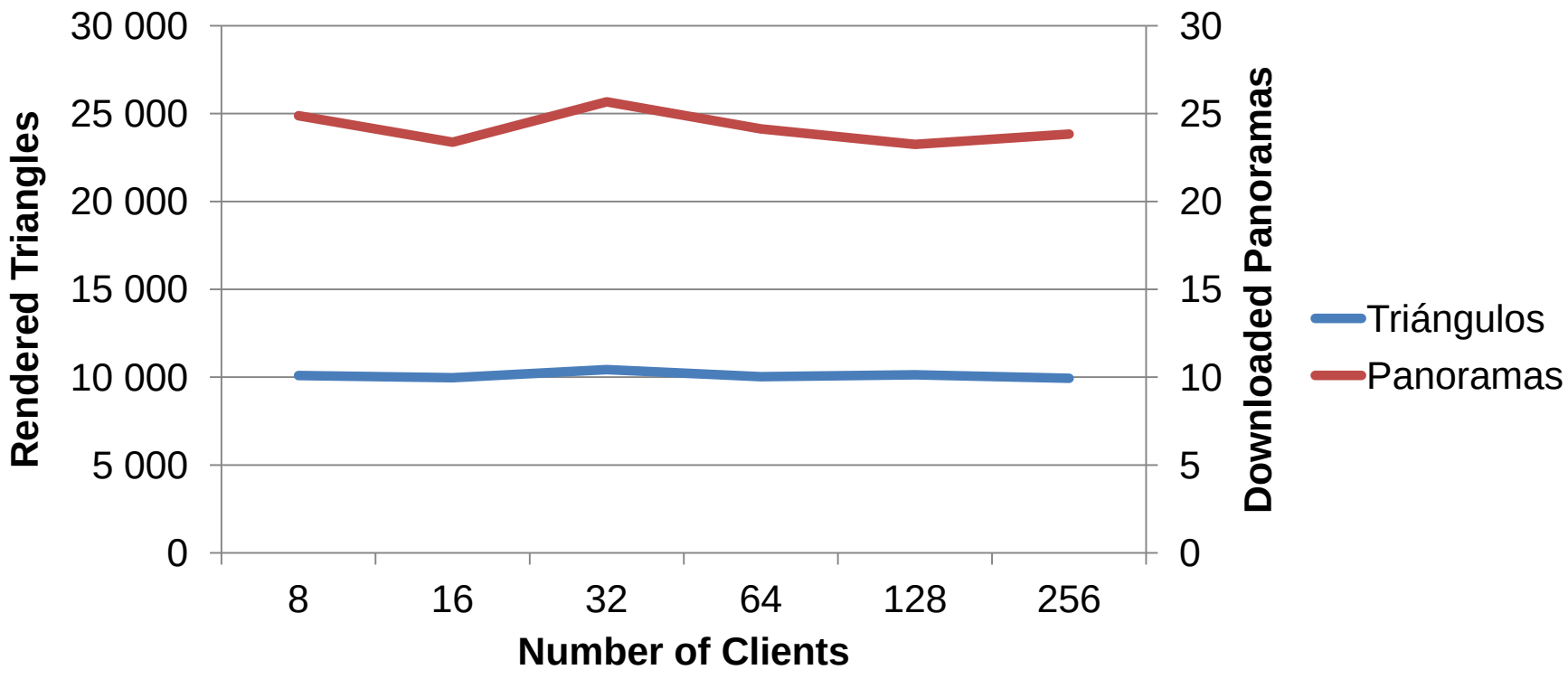
- CPU: Core2-Duo
- RAM: 2 GB
- GPU: GeForce 8800
- Disco Duro SATA

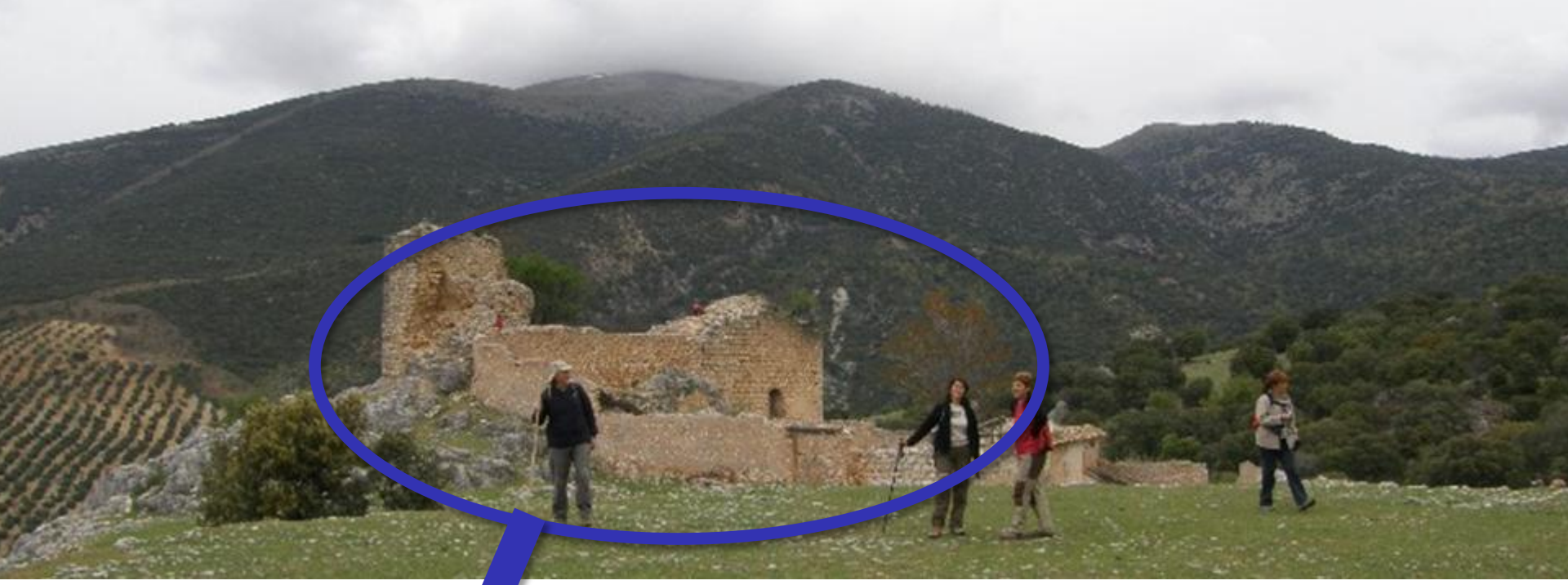
Conditions

- Linear flights
- Random speeds and flight directions.
- Medium terrain quality.

Results: Scalability

Average performance (measured from the client's side) for an increasing number of concurrent clients.





Future works

- Would it be possible to include 3D data?
  - From 3D scan?
  - Progressive transmission of meshes through cellular networks.