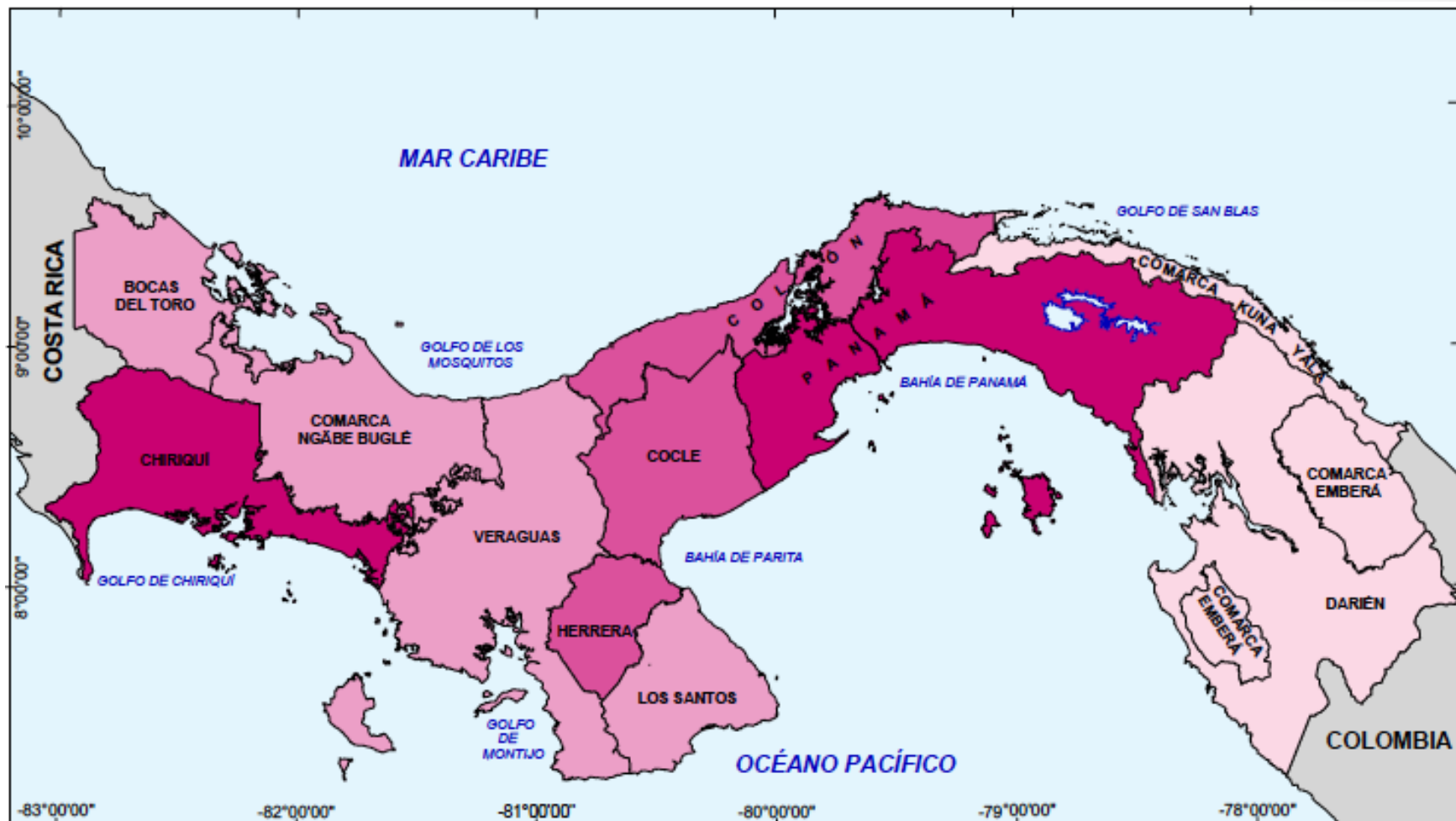


Finding ways to bring education to everyone in Panama through mobile learning

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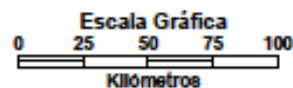
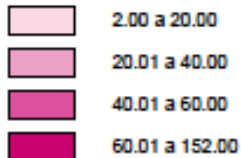
MIT, LINC 2013

Density of Population by Province, 2010



LEYENDA

Habitantes / kms²



FUENTE: INSTITUTO NACIONAL DE ESTADÍSTICA Y CENSO DE LA CONTRALORIA GENERAL DE LA REPUBLICA, CENSOS DE POBLACION Y VIVIENDA 2010, RESULTADOS FINALES BÁSICO. CUADRO N°11



ELABORADO POR LA SECCION DE CARTOGRAFIA,
INSTITUTO NACIONAL DE ESTADÍSTICA Y CENSO,
CONTRALORIA GENERAL DE LA REPUBLICA

Motivation

- Mobile devices have all the tools to perform functions of computers.
- Wi-Fi and mobile networks provide connections everywhere, anytime.
- Free Internet access, government project.
- High smart phone penetration

“Internet para Todos,” Internet for Everyone

- 86% of the population has Internet accessibility.
- Wi-Fi network - 1,104 public places in 41 different towns: public schools, parks, public health centers, recreation places, etc.
- It includes rural areas of indigenous populations: Ngäbe Buglé, Guna Yala y Emeberá-Wounaan.

“Internet para Todos,” Internet for Everyone

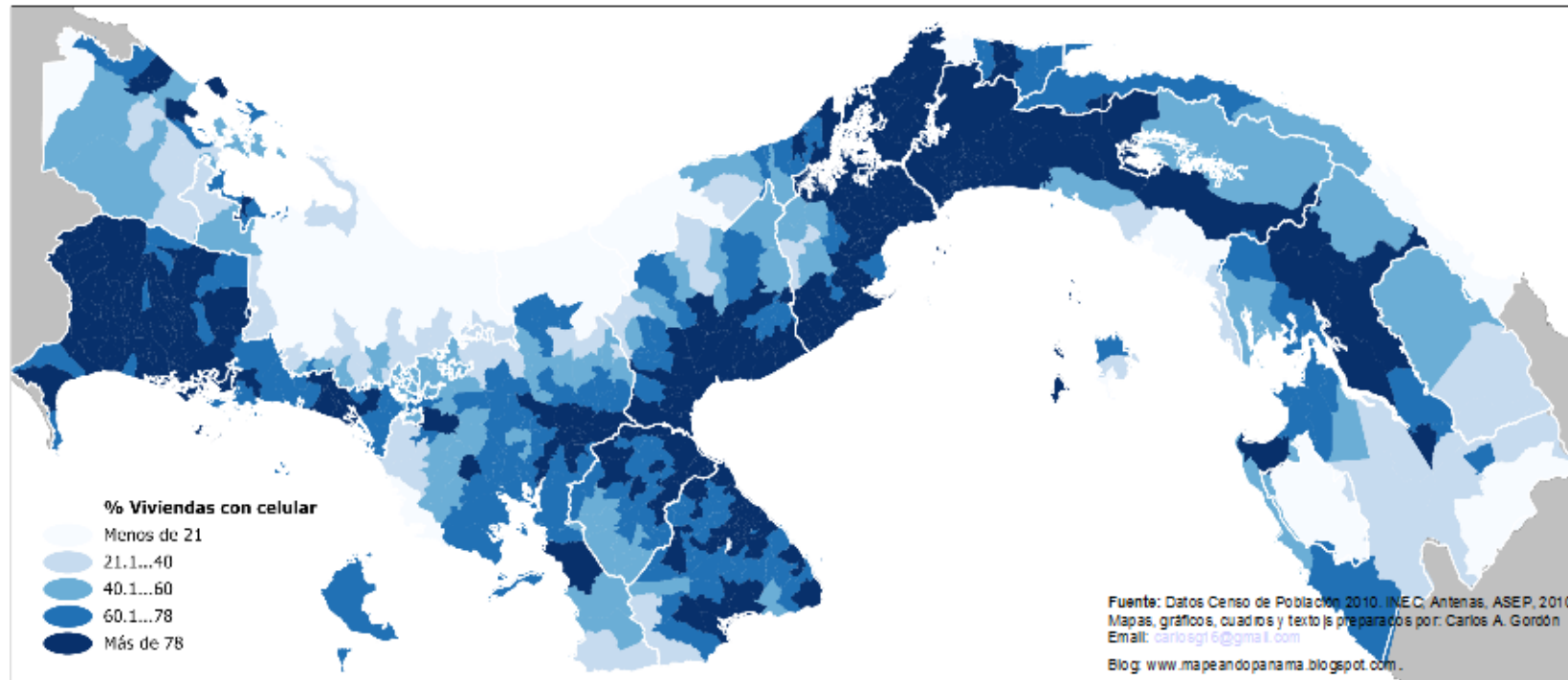
- In May 2013 there were 870,000 users –
 - around 62% of the users are students at different levels
 - 8% entrepreneurs and small business users
- In NRI (networked readiness index), the country went up 11 positions to get in the 46 position, the second in Latin America, after Chile (34).
Global Information Technology Report 2013, World Economic Forum.

Cellular phone penetration

- In 2010, 6.5 million cellphones connected in the network.
 - Around 185.4 devices per 100 people, compare to 100 devices per 100 people in the US.
- The network reaches 90% of the population and 45% of the territory.

Cobertura del servicio de telefonía celular en las viviendas.

Panamá. Año: 2010.



Antenas instaladas según proveedor de telefonía celular



Movistar
94 antenas



Digicel
442 antenas



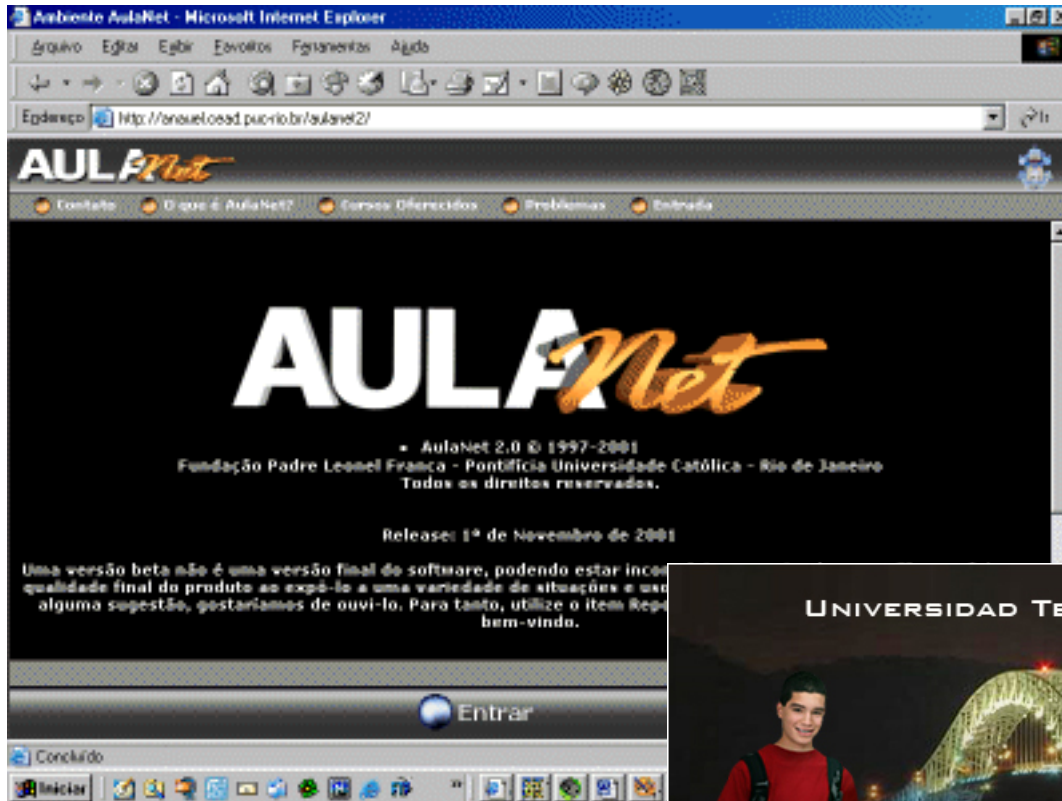
C&W
601 antenas



Claro
483 antenas

Virtual Education at UTP

2000,
Pontificia Universidad
Catolica de Rio de Janeiro
(PUC-Rio)



2003



Virtual Education at UTP

- 2008, UTP changed to Moodle, open source CMS.
- 2010, the project MLEA was accepted for funding
 - Mobile learning environment adapter, an application to provide a customized access to Moodle in Android based devices.

Related work

- (Colazzo, 2003), a course management system adapted to mobile users' needs, using web services.
- (Wains and Mahmood, 2008), framework for integrating a mobile learning environment.
- (Ibrahim and Zhao, 2009), a conceptual model of a framework for mobile devices.
- Moodle (Module Object-Oriented Dynamic Learning Environment) announced an implementation of Moodle 2.0 on iPhone and Android.

Limitations

- Mobile infrastructure in Panama does not cover all the country.
- 2G and 2.5G mobile access is common.
- Public wireless Internet access mainly in urban areas.
- Main issue:
 - Create a light application that can work on 2G and 2.5G
 - MLEA requirements

MLEA - Mobile Learning Environment Adapter

- It is an interface that connects with Moodle platform and a native application for Android based mobile devices.
- Selected features developed:
 - Synchronous communication – chat.
 - Asynchronous communication – forums and messaging.
 - Also calendar, assignment, short quiz, evaluation, courses, download, and localization.
 - Each of these features have different settings depending on a profile, either student or professor.

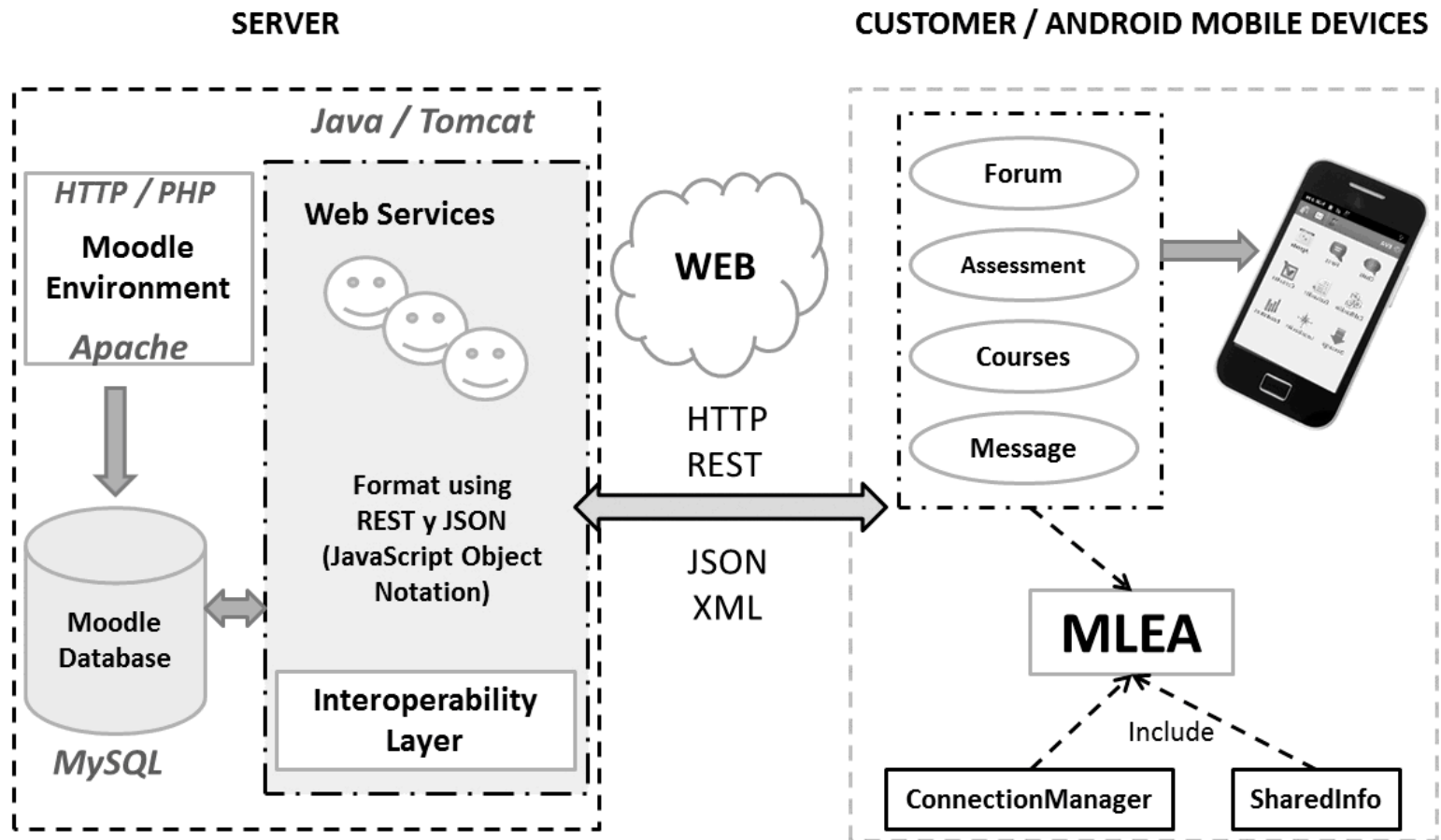
MLEA - Mobile Learning Environment Adapter

- **Synchronous and asynchronous communication** tools: real time communication tool – chat, and forums and email messaging tools.
- **Agenda**, calendar function provided by Moodle.
- **Grading**, to keep track of student's performance by course.
- **Evaluation**, professors can grade and students see.
- **Download**, for time saving... readings.

MLEA - Mobile Learning Environment Adapter

- **Localization**, aggrupation settings for teamwork.
- **Statistics**, reports for professor's use.
- **Users**, who's connected.
- **Courses**, lists one's enrollment.

MLEA architecture



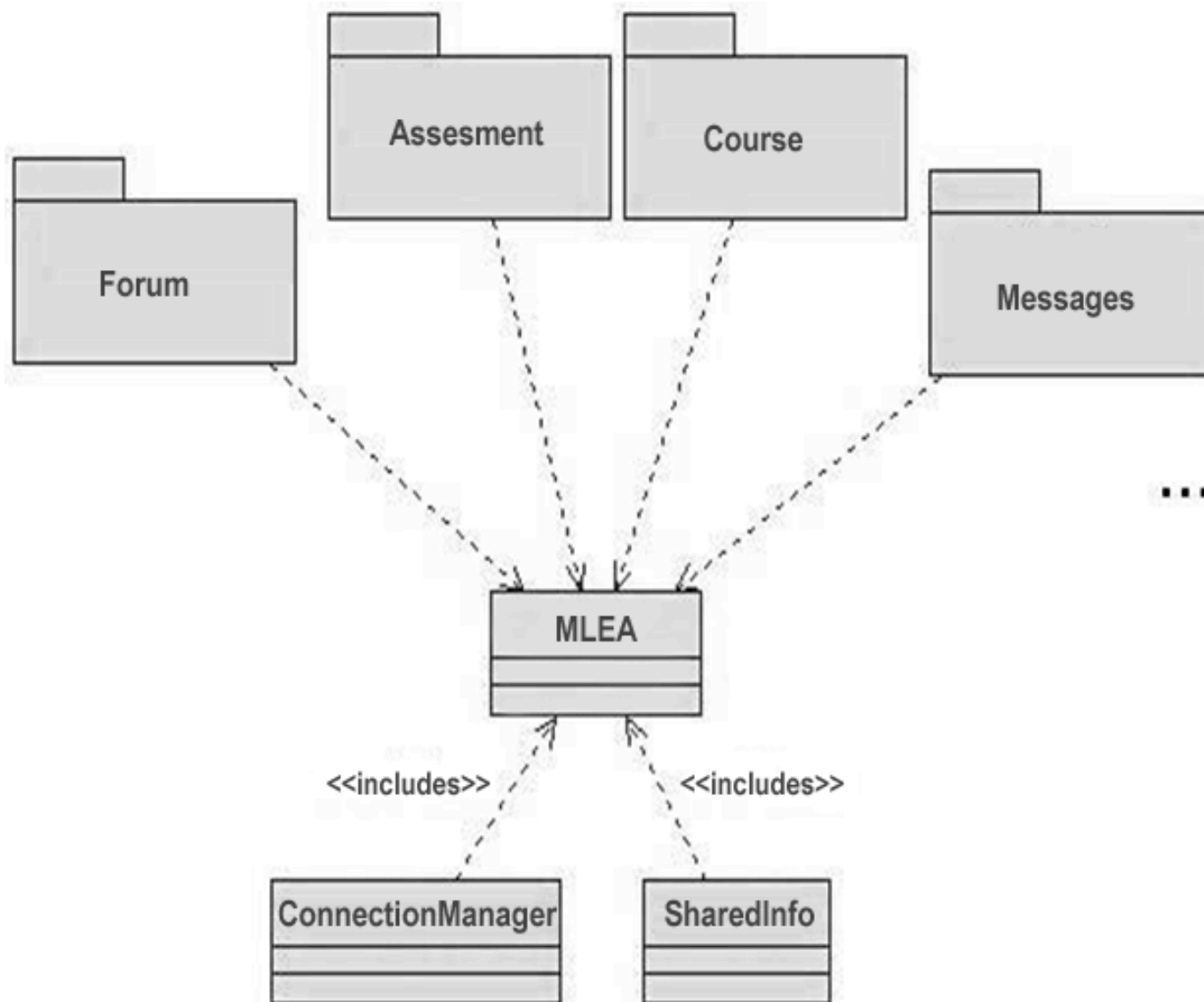
MLEA architecture

- It's based on **SOA**.
- Through **web services** clients have access to main resources on Moodle.
- At a **request**, a web service accesses Moodle database.
- In the **client side**, Android development pattern: each application screen has a Java class for actions.

Architecture - CLIENT

- The Android application, uses **Façade project pattern** to make communication between screens and the class responsible for invoking web services.
- For each functionality (i.e. forum, evaluation, courses, messages, chat...) there is a group of screens; a group of Java classes.

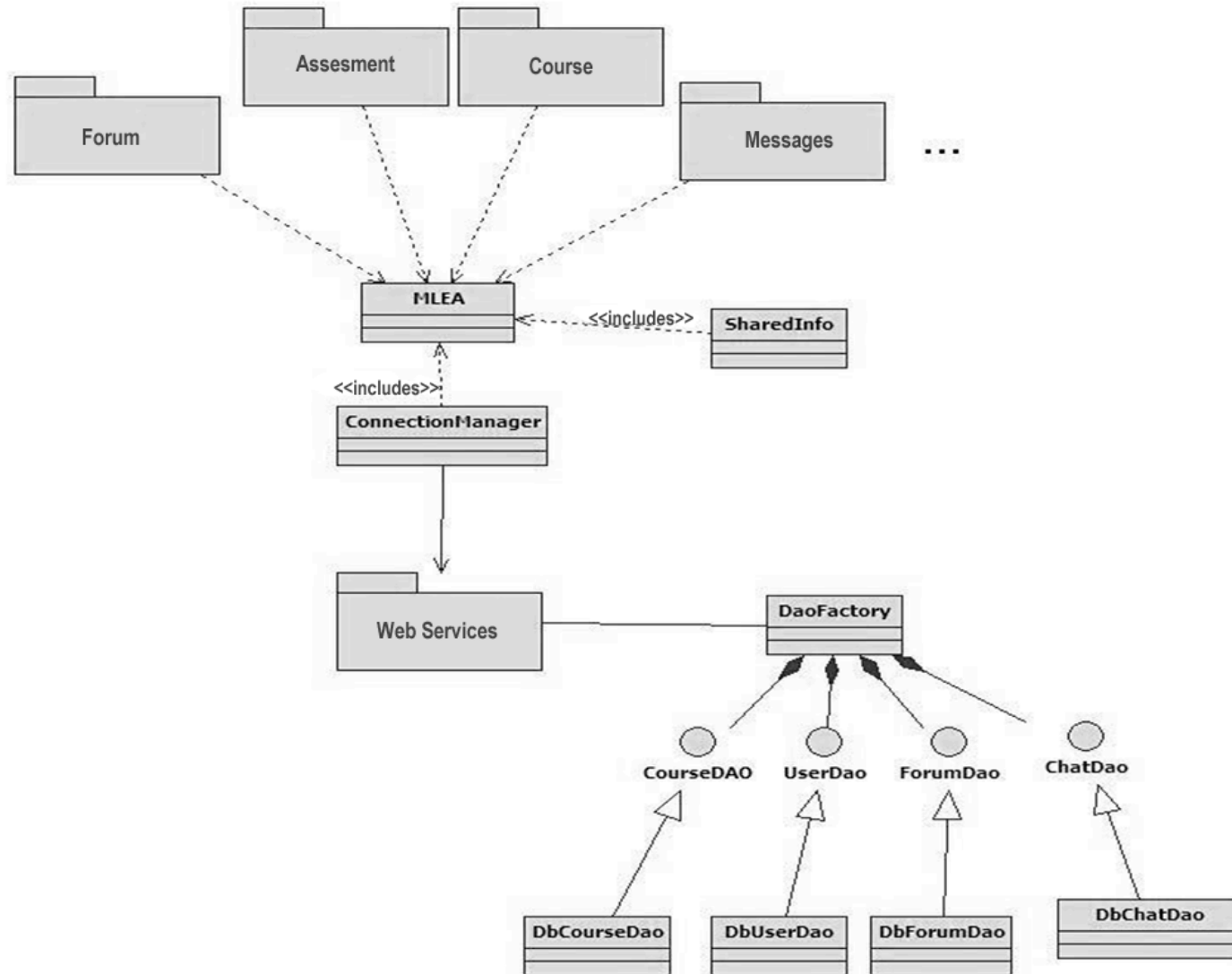
MLEA Class



MLEA Class

- It acts in the application like a façade to provide communication between classes.
- It defines an interface between `ConnectionManager` and `SharedInfo` classes.
- **SharedInfo** class manages the mobile device's database, where user information is stored (authentication, connected users' ID, etc.)
- **ConnectionManager** class connects with server.

MLEA - Server



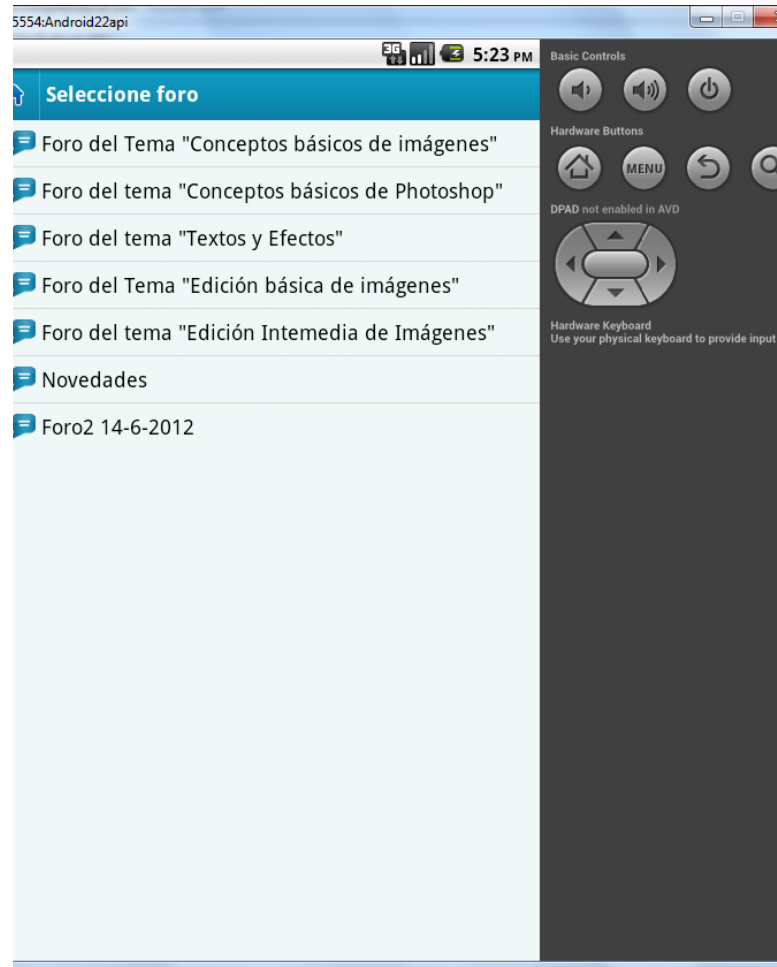
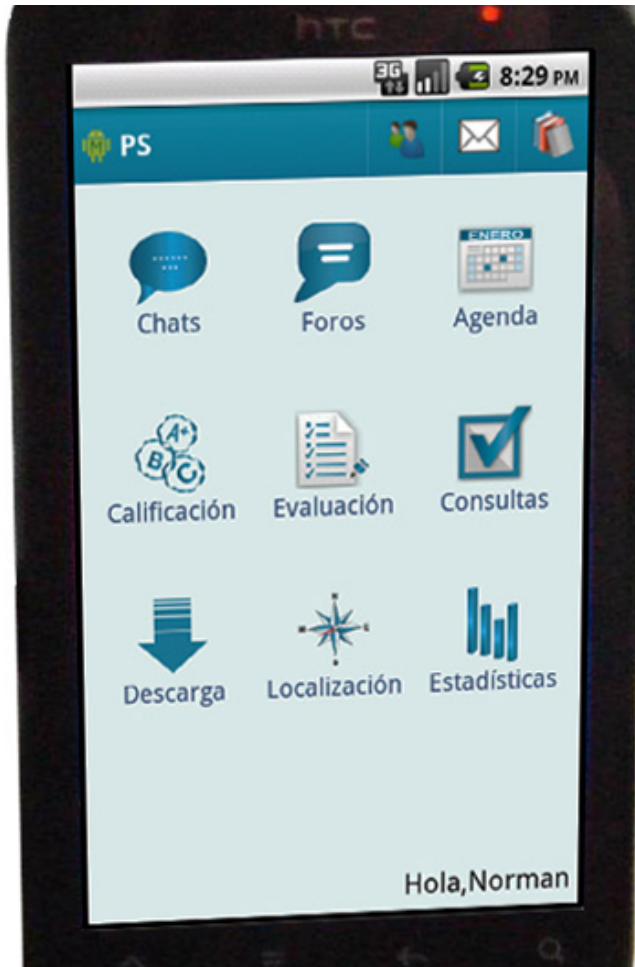
MLEA - Server

- The server side relies on design patterns to respond to client requests.
 - Web services use the **project pattern DAO** to access and manipulate Moodle database.
- For each data type used there is a DAO interface that defines the operations that can be performed.
- For higher flexibility, DAO classes are not instanced directly by web services; but a **factory** is used to create DAO classes.

Results


- Testing phase
 - Moodle server and courses.
 - Only students on campus.
 - Issues with power consumption and bandwidth.

Screens



Screens

MLEA Mobile Learning Adapter

 In your opinion, are social networks useful for education?

Due to the increasingly use of social networks many says that their use could be beneficial for education. What are the pros and cons of such use?

Reply

5554:Android22api

4:40 PM

Parcial 4

pregunta 1
intúa
mo: 0.0

Cuál no es un fabricante de Switches

- isco
- Toshiba
- nksys
- endNet

Anterior

Siguiente

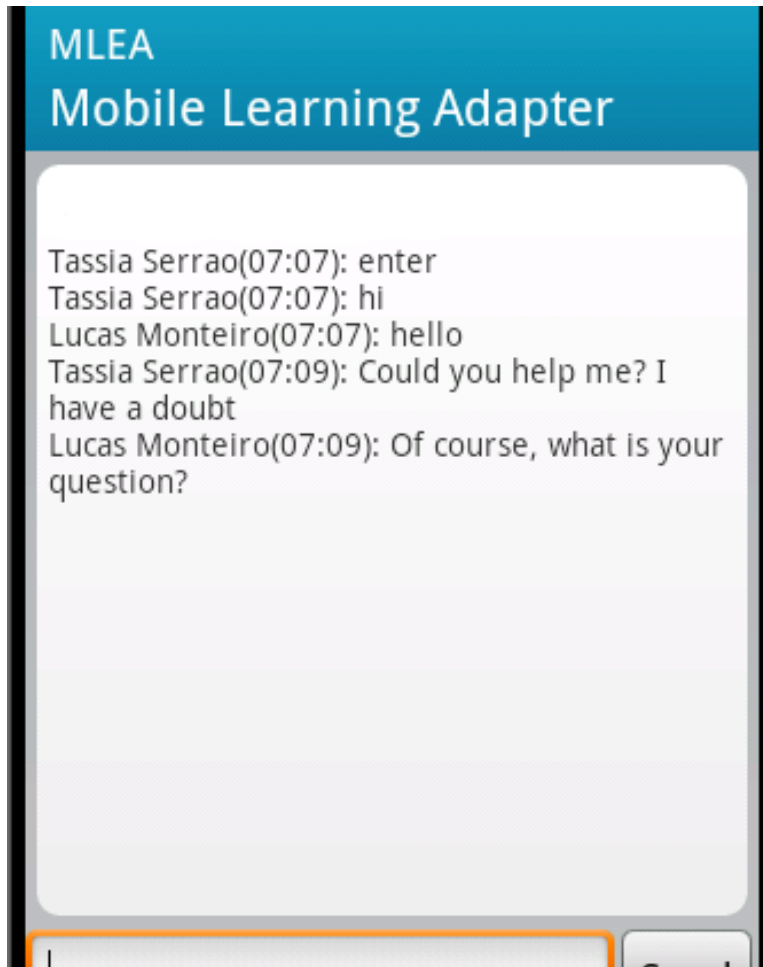
Basic Controls

Hardware Buttons

DPAD not enabled in AVD

Hardware Keyboard
Use your physical keyboard to provide input

Screens



CONCLUSION

- This architecture integrates several educational resources.
- The system was designed with software engineering techniques - web services, design patterns, ontologies, and mobile computing technologies.
- The architecture is based on SOA to facilitate reuse and extent the system scalability.
- Web services were implemented independently of Moodle.

Future work

- Maybe the main concern in mobile learning is assuring a light application in terms of **power consumption** and **bandwidth needs** that can guarantee its use, especially in **rural areas**.
- We want to collect data in order to find patterns of use.

ACKNOWLEDGMENT

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Thanks for your attention

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<http://mle.utp.ac.pa/moodle>

MLEA – why?

- Back in 2009, studies about preferences for technologies showed that 60% of young people under 30 consider a cell phone a necessity [2].
- As in 2012, surveys show that 60% of people “can’t live without their smart phones [3],” and not only that, but between 18 to 34 year old people are even more prone to such kind of devices, regardless their income [4].
- In consequence, providing the means for higher education students to access course resources in their smart phones is a way to facilitate learning and keep them interested.

MLEA – why?

- MLEA fosters virtualization which is one of the new trends in higher education. Virtualization, the process of creating a virtual version of something reduces costs that would be needed for resources if actual versions were created.
- Already in 2009 forecasts stated that as many as 16 million desktops could be virtualized by 2011 [5].
- Higher education institutions that adopt any kind of virtualization system are ensuring items for accreditation in the globalized environment they are right now [6].