

The Cloud for University City Campus

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INTRODUCTION

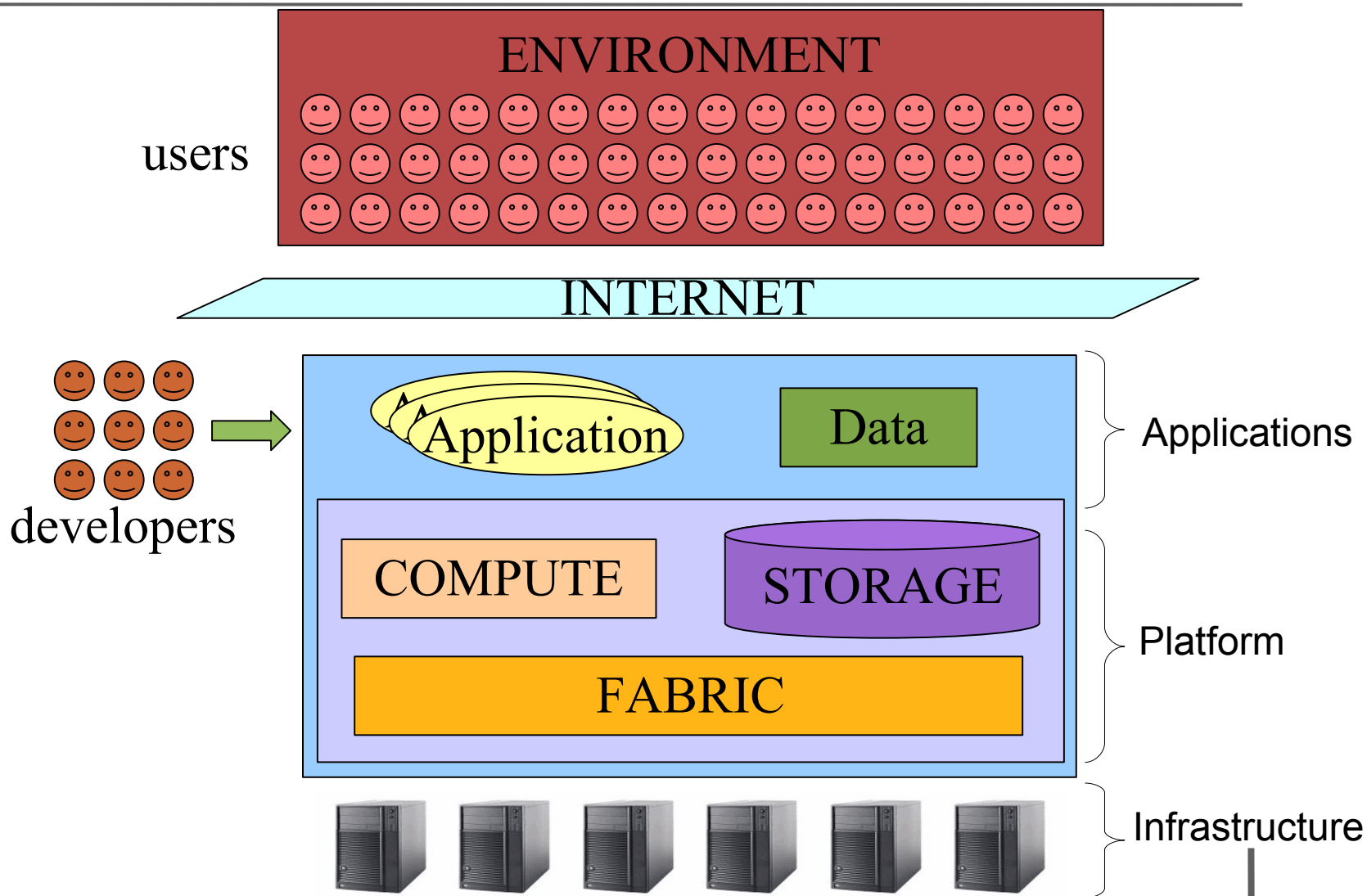
- Cloud technologies are ready to change the way in which we interact with Internet services, and can replace our local computing resources.
- Applications will play a fundamental role to test current ideas and tune/improve/develop the state of the art in cloud computing.
- In this talk we propose to use the cloud to create a virtual **University city campus** in Bologna, hometown of the **most ancient University** in the Western world.
- We can thus say that in our proposal the Past melts into the Future.



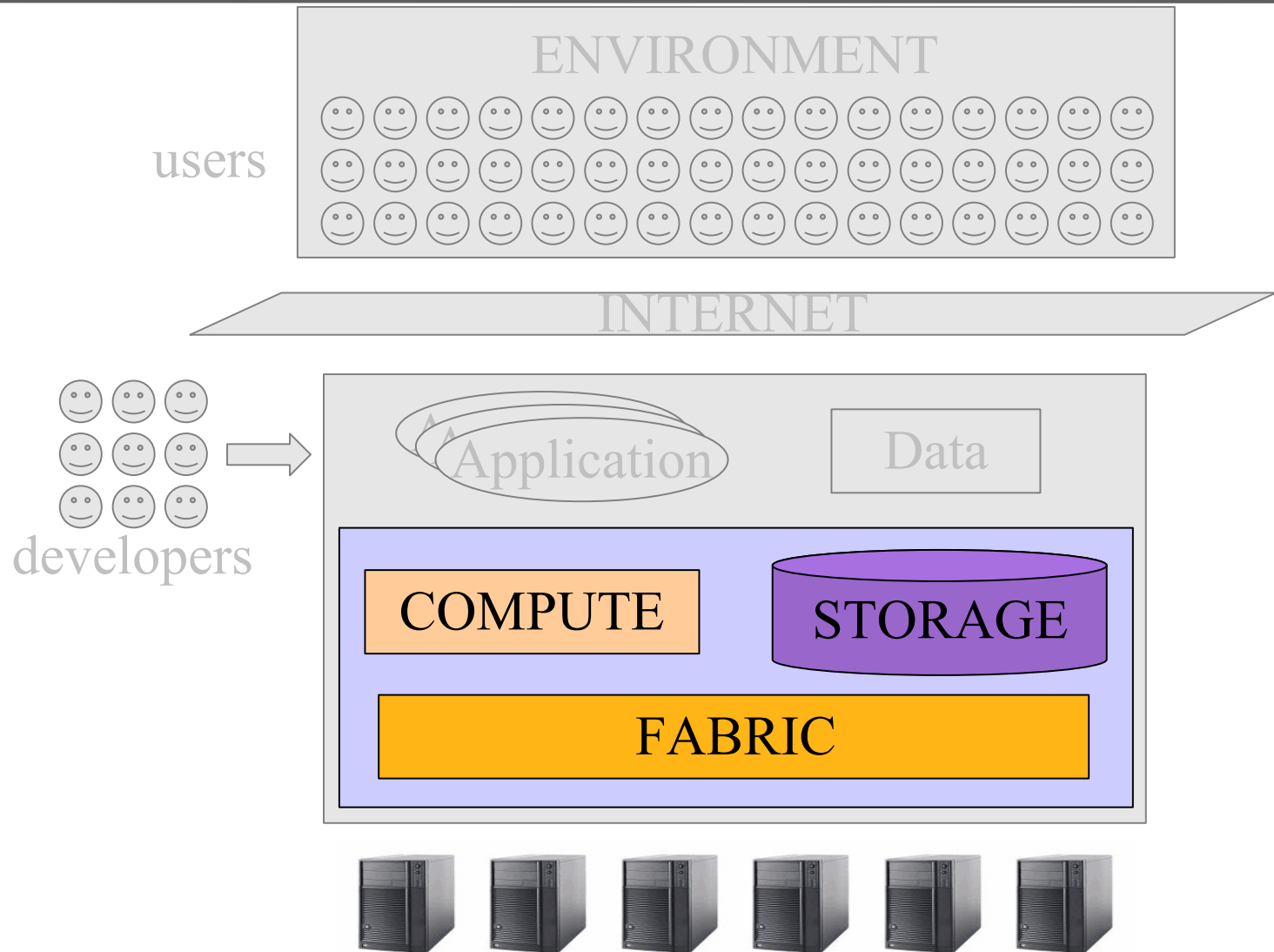
OUTLINE

- Making the Cloud: main actors.
- Social, technical and geographical features of the Bologna University city campus.
- Main phases of the project:
 - Pilot: turning on the basic infrastructure.
 - Internal development: application building and usage restricted to a limited number of users.
 - Integration: adding “global” services.
 - Extension: widening the user base.
- Opportunities and summary of the proposal.

ARCHITECTURE OF A CLOUD



NEXT: MAPPING TO THE BOLOGNA UCC





Components of the University City Campus Cloud Application

or: Why we think Bologna is a good choice

FEASIBILITY STUDY

- Users.
- Environment.
- Internet connection.
- Developers.
- Applications/Data.



POTENTIAL USERS

- Cloud applications are especially useful when they serve a large (and varying) number of users.
 - The University of Bologna has **about 85 thousands** students enrolled, making it one of the most attended universities in Italy.
-
- In addition,
 - **3,193** permanent faculty members.
 - **3,103** admin/technical units.
 - About **1,800** external faculty members.
 - Over **2,000** contract collaborators involved to a varied extent in research and teaching activities.



ENVIRONMENT (1)



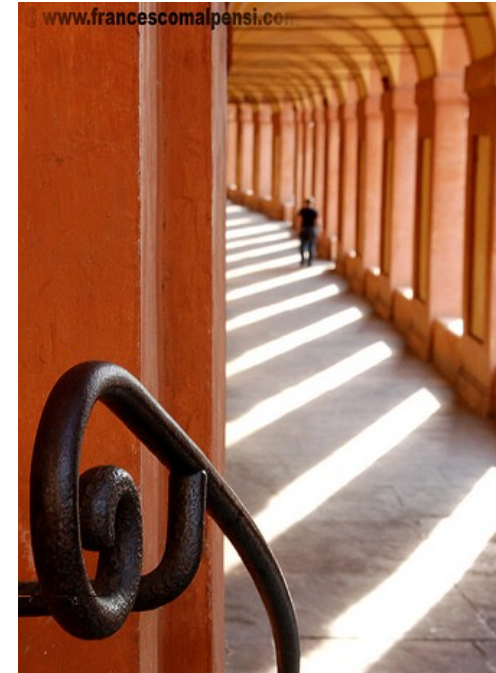
5 Campuses based in Bologna, Forlì, Cesena, Ravenna, Rimini and in a decentralized site in Buenos Aires.

23 Faculties, 70 Departments, 21 Research Centres, 224 degree programmes activated.

In Bologna, the campus is already **spread over the city**: University buildings alternate with private buildings and surround public squares.

ENVIRONMENT (2)

- Nice weather and *portici* – yes, this is a very important feature of our cloud application...



- In Bologna, streets and squares are the perfect physical environment over which a virtual campus can be built.

ENVIRONMENT (3)



- Students already spend a lot of their time in squares and coffee bars.

- It is not unusual to see them studying or even attending outdoor classes.



NETWORK CONNECTION

- A significant part of the city center is covered by wireless networks freely available to University students and staff and citizens.
- Users of Bologna City Council (residents and employees).
- Users of the Bologna University (students, teachers, technical-administrative staff).





DEVELOPERS

- The University provides several undergraduate and post graduate degrees in computing.
- These students can be both users and developers, coding applications as project works and experimental theses.
- The integration of cloud technologies into computing curricula with the possibility of developing real applications used by other students can help in building a competence center.



APPLICATIONS/DATA (1)

- **231** institutional websites, **126** web services and about **90,000** online contents are an integral part of the University Web Portal.
- → Many services are ready to be put in the cloud.
- → Lots of data are already available to application developers.
- Main areas:
 - Research.
 - Didactics.
 - Virtual Labs.
 - Mobility.
 - ...

The screenshot displays the official website of the University of Bologna. At the top, the university's name is written in both Italian and English, along with the founding year A.D. 1088. A navigation bar includes links for Map, Contact us, UniboSearch, and Directories. A search bar with a 'search' button is prominently featured. The left sidebar contains a 'Home' menu with links to University, Students, Academic programmes, Research, International Relations, and Libraries and Museums. Below this is an 'ALWAYS USEFUL' section with links to the Student Guide, Student registry offices, Almalwelcome!, Online student services, Merchandising, and Italian courses for foreign students. The 'ONLINE SERVICES' section includes a dropdown menu for 'Choose online services'. The main content area features 'HIGHLIGHTS' with sections for Summer Schools, Unibo International Programmes, and International Students. A 'Student Guide - ECTS Information package' is also highlighted, with a 'Read more' link. At the bottom, there are links for Multicampus and International programs, and a map showing the university's locations in Bologna and Ravenna. A 'Summer School of Italian Language and Culture' is also advertised.



APPLICATIONS/DATA: faculty



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Danilo Montesi

Professore ordinario

INF/01 INFORMATICA

<http://www.unibo.it/docenti/danilo.montesi>

Pubblicazioni

Pagine: [1](#) [2](#) [3](#) [4](#) [5](#) su 5 [» Pubblicazioni antecedenti il 2004](#)

M. Bertoni, Giuliano F., Gianluca Gozzoli, M. P. Landini, M. Magnani, A. Messina, D. Montesi, *A case study on the analysis of the data quality of a large medical database*, in: , Database Technology for Data Management in Life Sciences and Medicine, WASHINGTON, D.C., IEEE, 2009, pp. 308 - 312 (atti di: Database and Expert Systems Application, Linz, Austria, September 2009) [atti di convegno-relazione]

S. Andreozzi, P. Ciancarini , D. Montesi , R. Moretti, S. Pardi, *Implementation and Performance Analysis of XMatch: a Language for Quality-based Selection of Grid Services*, «JOURNAL OF GRID COMPUTING», 2009, 7:2, pp. 247 - 264 [articolo]

A. Catalano, M. Magnani, D. Montesi, *Modeling with BPMN and chorda: a top-down, data-driven methodology and tool*, in: , ICEIS 2009 - Proceedings of the 11th International Conference on Enterprise Information Systems, SETÚBAL, INSTICC, 2009, pp. 389 - 392 (atti di: 11th International Conference on Enterprise Information Systems, Milan, May 2009) [atti di convegno-relazione]

M. Magnani, D. Montesi, *Towards relational schema uncertainty*, in: , Lecture Notes in Computer Science - Scalable Uncertainty Management,

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APPLICATIONS/DATA: student

Riepilogo Esami Studente

https://almaesami.unibo.it/almaesami/studenti/attivitaFormativaPiano-list.htm?execution=e1s1

Alma Mater Studiorum Università di Bologna

AlmaEsami

Piano di studi - ~~CURSUS IN INFORMATICA (L-9906) (50)~~

Questa pagina ti mostra tutte le attività formative del tuo piano di studio e ti consente di prenotare gli esami che ancora non hai sostenuto.

Filtri ricerca

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+	1	28796 - COMPLEMENTI DI BASI DI DATI	8028	6	
+	1	30214 - FONDAMENTI LOGICI DELL'INFORMATICA	8028	6	
+	1	12569 - MATEMATICA COMPUTAZIONALE	8028	6	verbalizzato: 30 e lode
+	1	28792 - MODELLI E SISTEMI CONCORRENTI	8028	12	verbalizzato: 30
+	1	28793 - TIPI E LINGUAGGI DI PROGRAMMAZIONE	8028	6	verbalizzato: 30
+	2	28791 - ALGORITMI AVANZATI	8028	6	
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Prenota un esame per attività formative fuori dal piano di studi

EXAMS, CURRICULA



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APPLICATIONS/DATA: library system

The University of Bologna incorporates a huge and complex bibliographic heritage, which is integrated to the SBA - the University Library System.

The **University Library System (SBA)** is composed of:

- **85** service points
- **6 thousand** posts for reading and investigations
- **3.5 million** monographs
- **21 thousand** online periodicals
- **250** databases
- **20 thousand** electronic books

The **Inter-Library Centre (CIB)** is engaged in the supply of automation services and in the development of new library services.

An interesting starting point to develop rich services.



Main phases of the project



PHASE 1: PILOT

- Objectives:
 - Setup a cloud infrastructure.
 - Make some existing applications available in the cloud.
- Students will be able to access these services without coming in our labs.
- We will only have users, restricted to computer science students.

Move labs into public places in the city center, with students accessing resources directly from their laptops and the available Internet connection.

This phase will create the basic infrastructure to be used to develop custom applications.

- It will be based on existing systems.
- Initial user feedback collected, to drive the following phases.



PHASE 2: INTERNAL DEVELOPMENT

- In phase 2 will still involve only computing students, who will now become developers.
- The objective of this phase is to spread the competences that will be then needed to develop more complex applications for all other users.

The developed cloud applications (of this phase) will belong to two classes:

- General applications, decided by students and instructors (collective intelligence).
- Moving into the cloud other applications previously available inside our labs, to complete (or extend) phase 1.

PHASE 3: INTEGRATION

- At the beginning of this phase we will already have:
 - User feedback on pros and cons of using cloud applications to build the city campus.
 - Developers with competences in application development.
- At this point, we will start building applications of interest for the wider space of users: students and staff from other departments.
- This phase is the bridge toward the final step, where the first applications will be made available to people outside the department of computer science.

PHASE 4: EXTENSION

- With this phase, the first services will be available to everyone, tested and monitored.

AS IS



TO BE





OPPORTUNITIES

- Develop an environment and a set of applications which can be applied to several other contexts, e.g., other universities or environments with similar features.
- Deal with a real application of cloud technologies to identify potential areas of new development and test existing infrastructures, as well as experiment innovative services.
- Form students with strong competences on the cloud, giving them the keys to be the next developers or related ideas and advances.



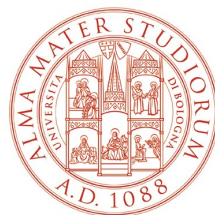
CRITICAL ASPECTS

- Privacy and data location.
 - Italian law requires complete knowledge on the location of the data.
- Acceptance.
 - Although the cloud should simplify many technical details, change is always a risk.
- Mobile@BUCC.
 - Many existing applications should be rethought to be used with mobile devices.
 - A path that we should anyway traverse.



SUMMARY OF THE PROPOSAL

- Building a University City Campus based on cloud technologies.
- Objectives: testing, development and experimental analysis of new techniques on a real and computationally demanding scenario, providing competences to students.
- Bologna seems to be an ideal place where to start, because of the aforementioned reasons.
- System building and deployment divided into small phases, to gradually reach all the objectives of the overall proposal.



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Thank you.