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Overview

Part 1:
- Learn@WU -> Sustainability
- Developments, Experiences
- System and Performance

Part 2:
- Differences between plain .LRN and Learn@WU
- Developed Modules
- Current in the Work
Learn@WU

- Designed for E-Learning in the large
  - Full coverage of e-learning materials for the first study year for all academic programs of the Vienna University of Economics and Business Administration
  - 3,000-4,000 beginners per year
  - Students have the choice between distance learning and presence learning in the class rooms

- One of the most intensely used e-learning platforms on universities world-wide
  - Up to 4.3 Mio hits,
  - Up to 1.2 Mio page views per day,
  - Up to 600 concurrent connections
Current State
(Heidelberg figures + 10-40%)

- About 26,000 mostly interactive learning resources
  - Most content developed by domain experts via MS Word
  - Organized via a hierarchical “concept space”

- Broad Acceptance
  - 2 Usability Studies (students, teachers) triggered more than 100 changes
  - About 19,000 registered students
  - Students solve up to 360,000 interactive exercises per day
  - Average response time less 0.25 sec
  - More than 70,000 exams through mark-reader
  - 870 classes are using currently learn@wu, >400 community administrators
  - “Without Learn@WU, the operations of our university would not have been possible” (Christoph Badelt, President of WU)

- Growth Path
  - Inhouse teaching, providing more support for classes in higher semesters
  - Signed contract with Ministry for providing access to our e-learning materials for high-shools
  - Tailored version of learn@wu for high-schools in use with very positive feedback (“Bildungsserver Burgenland”)
Organizational Changes

- **Part of the university infrastructure**
  - Governed by a *Steering Committee* (Vice President of infrastructure, Vice President of Academic Affairs, CIO, Chair of Department of IS (project lead), Chair of Department of Pedagogics)
  - Important Role in the forthcoming change from diploma studies to bachelor and master programs

- **Team**
  - 28 People employed by project (15 FTE)
  - 4 persons technical support (incl. help desk)
  - 1 person didactic support

- **Development:**
  - Deployment of first version in October 2002 based on OACS
  - Relaunch of platform based on DotLRN in April 2004
  - More powerful Server-System in Sept 2004
Hardware Configuration

- **Legacy System**

- **Database Server**
  - 8-way Xeon 2.7 GHz (IBM x445)
  - PostgreSQL 7.4

- **Pound, AOLserver 4.x**
  - Dual Xeon 2.8
  - Static pages

- **AOLserver 4.x**
  - 8-way Xeon 2.7 GHz (IBM x445)
  - Dynamic content

- **Internet**
  - XML-RPC
  - SSL

- **XML-RPC**
  - 8-way Xeon 2.7 GHz (IBM x445)
  - PostgreSQL 7.4
Experiences with the System

**Continuous Performance Tweaking**
- Tradeoff between speed and functionality (more later)
- Page view performance most time <0.15 secs (<500 users, <10 views/sec)
- Above this performance decreases in a non-linear fashion (hurts esp. portal pages and forums)
- Max sustained rate 35 views/sec, up to 1000 users

**Hardware**
- 8-processor for dynamic web pages machine scales well
- Database server does not scale well (max load: 4)
  - Most data cached (very little disk i/o)
  - At least half of the CPUs are idle while SQL-queries slow down
- Most likely: memory bandwidth bottleneck

**Software**
- System slows down after long run (about 10% per day, daily reboot helps)
- Newer versions of AOLserver seem less stable
Usability of the system

Active Users: 903 active users in last 10 minutes, 5133 in last 24 hours (9149 total)
Current System Activity: 4891 exercises last 15 mins, 30.1 views/sec, 2.01 views/min/user, avg. view time: 29.9
Current System Load: 18:02:11 up 11 days, 22:20, 1 user, load average: 5.91, 5.34, 4.75
Current Avg Response Time/sec: 0.26 (last minute), 0.35 (last 30 minutes), 0.36 (last hour), 0.28 (last 23 hours)
Details

Avg. Response Time in milliseconds

Trend

Max

Tue Nov 23 15:28:06 CET 2004 2309 (38.48 ms)
Tue Nov 23 16:07:06 CET 2004 2306 (38.43 ms)
Tue Nov 23 15:27:35 CET 2004 2299 (38.32 ms)
Tue Nov 23 15:20:06 CET 2004 2275 (37.92 ms)
Tue Nov 23 15:21:06 CET 2004 2274 (37.93 ms)
Tue Nov 23 15:30:06 CET 2004 2266 (37.77 ms)
System Infrastructure

- Most of the newly developed components of Learn@WU are implemented in XOTcl

- XOTcl achieved increased acceptance in Tcl community
  - Part of the Active State Core distribution
  - Part of Tcl Aqua for Mac OS X (part of Tiger)

- Benefits
  - Highly flexible, fastest Tcl-OO, thread-safe
  - Various language constructs e.g.:
    - C-based positional arguments, can reduce invocation overhead of ad_procs by a factor of 6
    - Object/Class Serializer (well suited for caching)
  - Two .apm packages are available (core, request-monitor)
    - Integrated with OACS api browser
Learn@WU vs. plain dotLRN

nowhere.wu-wien.ac.at

::xotcl::Class ::Counter

Class Relations

  ● subclass: ::AvgCounter®, ::MaxCounter®

::xotcl::Class create ::Counter \n  -parameter (report timeoutHs (stats "") (last "") (trend "") (c 0) (log 0) (nr_trend_elements 48) (nr_stats_elements 5)

Methods

Instances

  ::hours®, ::minutes®, ::seconds®
Class Relations

- subclass: ::AvgCounter®, ::MaxCounter®

::xotcl::Class create ::Counter 
  -parameter
  report timeoutMs
  (stats "") (last "") (trend "") (c 0) (log 0)
  (nr_trend_elements 48) (nr_stats_elements 5)

Methods

- instproc ++

  ::Counter instproc ++ () {
    my incr c
  }

- instproc destroy

  ::Counter instproc destroy () {
    after cancel [my set to]
    next
  }

instance end
Learn@WU vs. plain dotLRN

- Modifications of dotLRN
- Modifications of OpenACS
- Additional Components
  - Sitewide Search
  - OpenLTS
  - Homework/Gradebook
  - Problem based learning
- Integration with University Legacy-Systems
Modifications of dotLRN

- Departments + Classes implemented as communities
  - Now, these can have members, portal …
  - XOTcl-Community Objects for all access to community-data (cached)

- Class Instances inherit Class data
  - Class Instance portlets display content from parent classes
  - Classes are repositories for information common to all Class instances (e.g. general forum, learning materials, announcements, parts of Syllabus)
  - Members of a class instance also get content from class-packages into their personal portal

- Class Catalog
  - Hierarchical structure of studies, folders and classes
Modifications of dotLRN (cont.)

- Several other changes
  - `/dotlrn/www/admin/*/ became a separate package for dotlrn-wide admin stuff
  - Allow multiple site nodes for one package
    - Configuration of a package can be reused
  - Changed the relationships between communities
    - Multiple departments responsible for one class / class instance
  - Changed the relationships between communities and persons
  - More metadata information for departments (opening hours, telephone, …)
  - Performance changes
    - Currently no dynamic portal for classes/class instances
Modifications of OpenACS components

- Forums
  - Users can see which messages they have not read yet
  - Reading info saved on the message level

- Portal
  - Cached structure of openacs portals in XOTcl objects

- Site-wide Search
  - Allow indexing of MS-Word and Adobe PDF-Files
  - Separate search options for
    - Organizational information (e.g. syllabus),
    - Learning resources, or
    - Forums
  - Added Search tips
Site-wide search

Suche nach: “pgp” in Lernressourcen

Erweiterte Suche

Sueche: pgp

Resultate 1-6 von 6. Die Suche dauerte 0.50 Sekunden.

[Definition] PGP
Von Phil Zimmermann entwickelte kryptographische Software zur Verschlüsselung von E-Mail und Dateien. Verwendet asymmetrische Algorithmen (RSA), symmetrische Verfahren (DES, IDEA) und Hash-Funktionen (MD5).

Quelle: Einführung in betriebliche Informationssysteme
Datum der letzten Änderung: 20.03.2004 11:54:24

Fa Vergschlüsselungsmethode

Kategorien im Inhaltskatalog
- Einführung in betriebliche Informationssysteme
  - Sicherheitstechnische Grundlagen
- Elektronisches Geld, Zahlungssysteme und Sicherheit
  - Elektronisches Geld, Zahlungssysteme und Sicherheit
- Netzwerke und Netzwerksicherheit
  - Einheit 07
  - Einheit 08
Site-wide search – Search Tips

Search results
Full text search: search results
LV-Information [ Learning resources ] [ Discussion forums ]
VWZ Suche  Erweiterte Suche

Vorlesungsverzeichnis der WU Wien
Through this tool, you can search the complete lecture course offering of the WU Vienna.

Search for: "VWZ" in LV-Information Results 1-7 of 7. The search took 0.31 seconds.

Termine Sommeruni
The schedules of the VLP WPR I and the associated AG (Sommeruni) are available in the VWZ.
Quelle: Wirtschaftsprüfung /
Datum der letzten Änderung: 02.09.2004 17:04:55

Termineänderungen!
VWZ. The following changes to the lecture courses: 1635, 2172, 2173 and 2174 take place on the following days: Mi, 03.11.2004, 16:00 - 17:30, Hs. IX (Kolpinghaus) Mo, 02.12.2004, 09:00 - 10:30, H. 05. (A), Endklausur
Quelle: Marketingentscheidungen im Auslandsgeschäft
Client side processing of exercises

Unit 1 Grammar Task 1: Present continuous vs. present simple 1

In the following excerpt from the text "Hard Labour" in the reading section, select the most appropriate form of the verb for each gap. The first three are done for you.

1. Thousands of students are working all hours to hold down a term-time job - but are they harming rather than helping their studies, asks Helen Carter.

3am: her flatmates return ✔ x home from their night out but Karen Graham is just getting ✔ ✔ out of bed to go to work. Graham, a third-year English and politics student at Manchester University, like thousands of students across the country, has been forced to take a part-time job to fund her studies and clear debts. Some of her shifts at Manchester Airport begin ✔ ✔ at 5am. "I work ✔ ✔ from 5am to 2pm or from 10am to 7pm," she is saying ✔.

'When I am doing ✔ ✔ the early shift I have to get a bus and often get ✔ ✔ harassed by drunk people. I've worked out that each shift takes ✔ ✔ ✔ me 12 hours because travelling time is taking ☒ ✗ 3 hours." Graham, 21, is thinking ✔ ✔ of quitting the job as the combination of her final year's studies and the long hours is getting ✔ ✔ too much to cope with. "The last thing I want ✔ ✔ ✔ to do when I finish ✔ ✔ work is open a book and start studying."

Wie soll dieses Beispiel in Ihrer persönlichen Lernhistorie eingeordnet werden?

Als richtig gelöst
Als falsch gelöst
Nicht vermarken
Client side processing of exercises

Unit 1 Grammar Task 1: Present continuous vs. present simple 1

In the following excerpt from the text “Hard Labour” in the reading section, select the most appropriate form of the verb for each gap. The first three are done for you.

<table>
<thead>
<tr>
<th>Aufgabe 1</th>
<th>100.00 Punkte</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thousands of students [are working][all hours] to hold down a term-time job - but [are they harming][all hours] rather than helping their studies, asks Helen Carter.</td>
<td></td>
</tr>
</tbody>
</table>

3am. her [flatmates][are returning][all hours] home from various times, especially late at night. [Details] like thousands of students across the country, has been forced to take a part-time job to [fund][all hours] her studies and [clear][all hours] debts. Some of her [shifts][are beginning][all hours]; at 5am. "I [work][all hours] from 5am to 2pm or from 10am to 7pm," she [says][all hours].

"When I [do][all hours] the early shift, I have to get a bus and often [get][all hours] harassed by drunk people. I've [worked][all hours] out that each shift [takes][all hours] me 12 hours because travelling time [takes][all hours] 3 hours." Graham, 21, is [thinking][all hours] of quitting the job as the combination of her final year's studies and the long hours [is getting][all hours] too much to cope with. "The last thing I [want][all hours] to do when I [finish][all hours] work is open a book and start studying."

Wie soll dieses Beispiel in Ihrer persönlichen Lernhistorie eingeordnet werden?

[Als richtig gelöst] [Als falsch gelöst] [Nicht vermerken]
Homework – Students View

### Assignment

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Availability</th>
<th>Status</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework 1</td>
<td>Start: 2005-04-01 00:00:00 End: 2005-05-07 00:00:00</td>
<td>Missing</td>
<td>-/20.00</td>
</tr>
<tr>
<td>Exam 1</td>
<td>Start:</td>
<td>Missing</td>
<td>-/0.00</td>
</tr>
</tbody>
</table>

Homework – Teachers View

### Assignment

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Start</th>
<th>End</th>
<th>Extension</th>
<th>Submissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework 1</td>
<td>01.04.2005 00:00</td>
<td>07.05.2005 00:00</td>
<td>33 0 0 0</td>
<td></td>
</tr>
<tr>
<td>Exam 1</td>
<td>Start...</td>
<td></td>
<td>33 0 0 0</td>
<td></td>
</tr>
</tbody>
</table>
Homework – Teachers View

Edit assignment

1. Properties

<table>
<thead>
<tr>
<th>Title</th>
<th>Homework 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release</td>
<td>Date</td>
</tr>
<tr>
<td>Start</td>
<td>01 04 2005</td>
</tr>
<tr>
<td>End</td>
<td>07 05 2005</td>
</tr>
<tr>
<td>Extension</td>
<td>no</td>
</tr>
<tr>
<td>Score release</td>
<td>after assessment of all students</td>
</tr>
</tbody>
</table>

2. Tasks

<table>
<thead>
<tr>
<th>Instructions</th>
<th>Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read the attached article</td>
<td>text</td>
<td>20.00</td>
</tr>
</tbody>
</table>

3. Extension for certain students

<table>
<thead>
<tr>
<th>Student ID</th>
<th>Name</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Grading

It is not possible to grade ongoing assignments.

Homework 1

1. Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Peter Alberer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum points</td>
<td>20.00</td>
</tr>
<tr>
<td>Instructions</td>
<td>Read the attached article</td>
</tr>
</tbody>
</table>

2. Documents

<table>
<thead>
<tr>
<th>Name</th>
<th>Size</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>article.zip</td>
<td>171 KB</td>
<td>04.05.2005 18:31</td>
</tr>
</tbody>
</table>

3. Submission

<table>
<thead>
<tr>
<th>Add submission afterwards</th>
<th>Add correction</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Size</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment: this is my submission
Problem Based Learning
Problem Based Learning
Integration with University Legacy-Systems

- Authenticate and auto-register university users
- Class Instance support
  - Get basic information (title) via XML-RPC
  - Replicate calendar items (date and room of lectures) via XML-RPC
  - Replicate class instance members via XML-RPC
    - Students enrol courses via legacy system, checks pre-requirements
    - Enrolment data is automatically synchronized with Learn@WU
    - Users not yet registered with OpenACS are auto-registered
  - Class instance data (members, dates, title) is kept in synch by ongoing background replication
Current Development

- **Implementation Work**
  - Send SMS from Learn@WU
    - Via central university infrastructure
    - Can be used by the notification service
  - Copy/Clone/Delete communities
  - Import/Export communities
  - Integrate Gradebook module with the exam server
  - Good Chat/Instant Messaging solution still missing
  - University-wide Intranet
  - Community System for Alumnis (questionnaire in development)
  - Need better integration with universities legacy system

- **Researchy issues**
  - Work on auto-grading of free-text exercises based on LSA

- **Incentive models for learning resource providers (teachers)**
Current system status – learning resources
Homework – students view
<table>
<thead>
<tr>
<th>Title</th>
<th>Source</th>
<th>Date</th>
<th>Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitarbeiter</td>
<td>Manuel</td>
<td>07.04.2005 12:00</td>
<td>regular</td>
<td>10.50</td>
</tr>
<tr>
<td>Student ID</td>
<td>Name</td>
<td>Date</td>
<td>Score</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------</td>
<td>------------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>9351252</td>
<td>Alberer Peter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0252510</td>
<td>Bachner Florian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0051662</td>
<td>Barnd Florin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0250523</td>
<td>Brezanska Jana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0150538</td>
<td>Camy Manuela</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0050594</td>
<td>Engelberger Oliver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0351646</td>
<td>Fellinger Julia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0252565</td>
<td>Fink Christian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>025092</td>
<td>Grbovic Tijana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0250510</td>
<td>Grossbner Therese</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0350358</td>
<td>Habersberger Florian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0251555</td>
<td>Hartweger Michael</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9952867</td>
<td>Heissenberger Patrick</td>
<td>07.04.2005 12:04</td>
<td>0.25</td>
<td></td>
</tr>
</tbody>
</table>