LEARN@WU Developments

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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”)

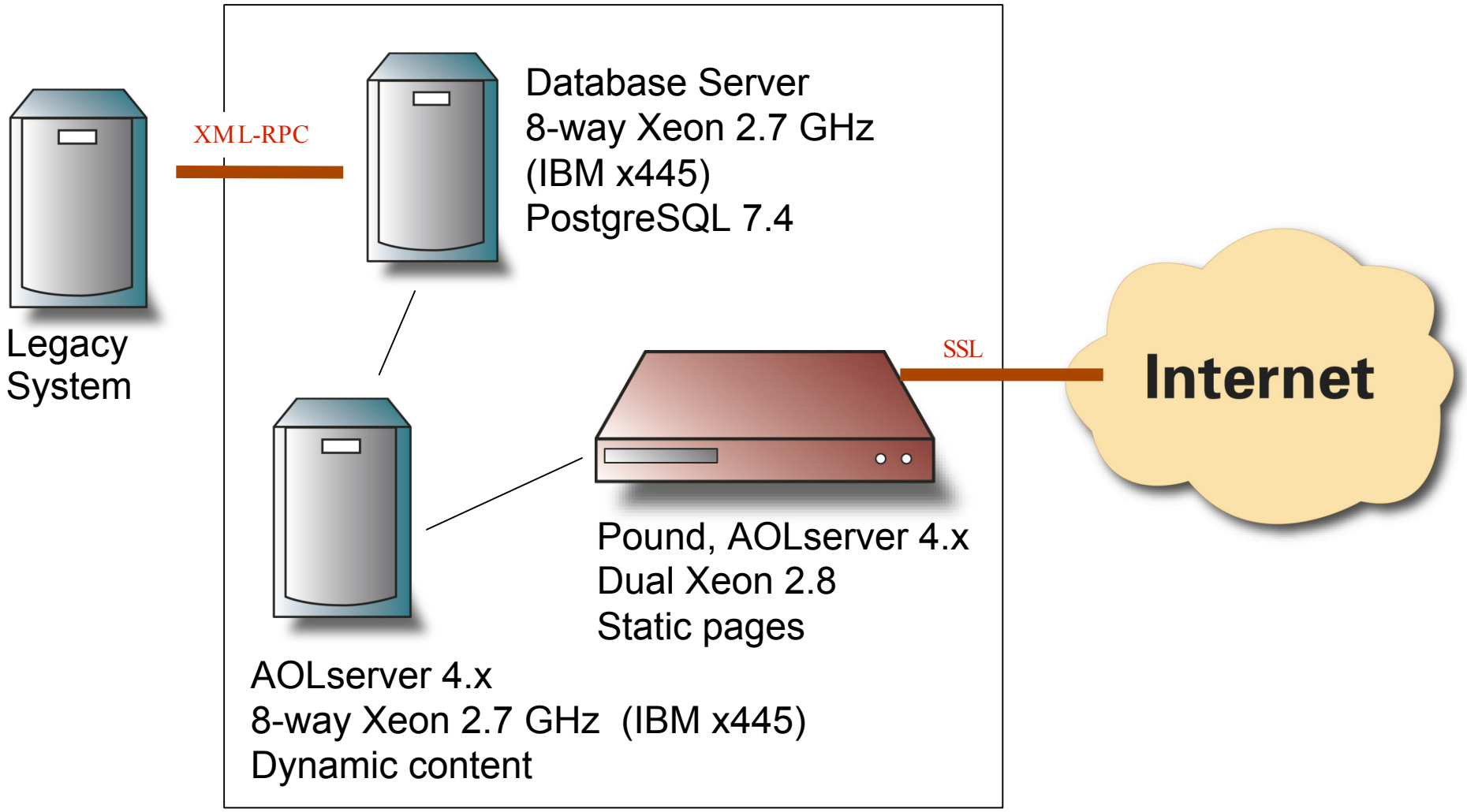
Organizational Changes

- **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



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

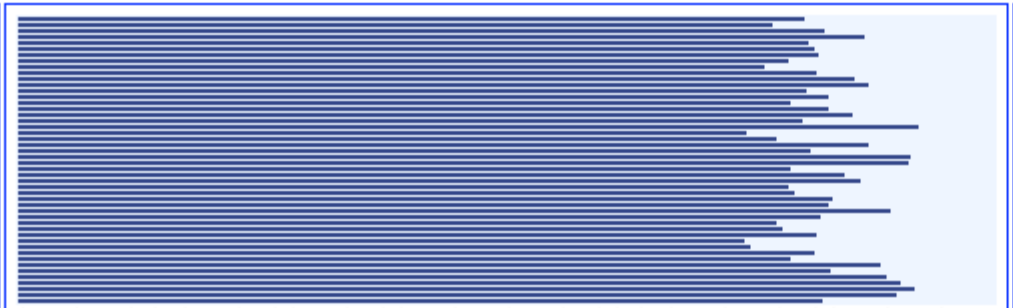
- **Hardware**
  - 8-processor for dynamic web pages machine scales well
  - Database server does not scale well (max load: 4)
    - Most data cached (very little disk i/o)
    - At least half of the CPUs are idle while SQL-queries slow down
  - Most likely: memory bandwidth bottleneck

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

Learn@WU - Performance statistics

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

Views per Minute



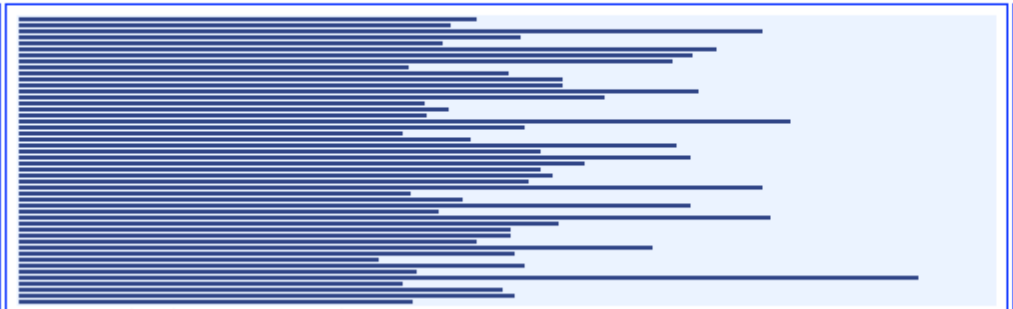
1772 1700 1814 1907 1781 1794 1801 1736 1679 1799 1881 1914 1774 1823 1741 1823 1877 1764
2025 1638 1707 1916 1784 2011 2004 1738 1860 1895 1733 1746 1832 1823 1964 1805 1708 1723
1797 1637 1649 1792 1737 1942 1829 1954 1985 2017 1977 1809

Tue Nov 23 15:28:06 CET 2004	2309 (38.48 rps)
Tue Nov 23 16:07:06 CET 2004	2306 (38.43 rps)
Tue Nov 23 15:27:05 CET 2004	2299 (38.32 rps)
Tue Nov 23 15:20:05 CET 2004	2275 (37.92 rps)
Tue Nov 23 15:21:05 CET 2004	2274 (37.90 rps)
Tue Nov 23 15:30:06 CET 2004	2266 (37.77 rps)

Avg. Response Time in milliseconds

Trend

Avg. Response Time per Minute



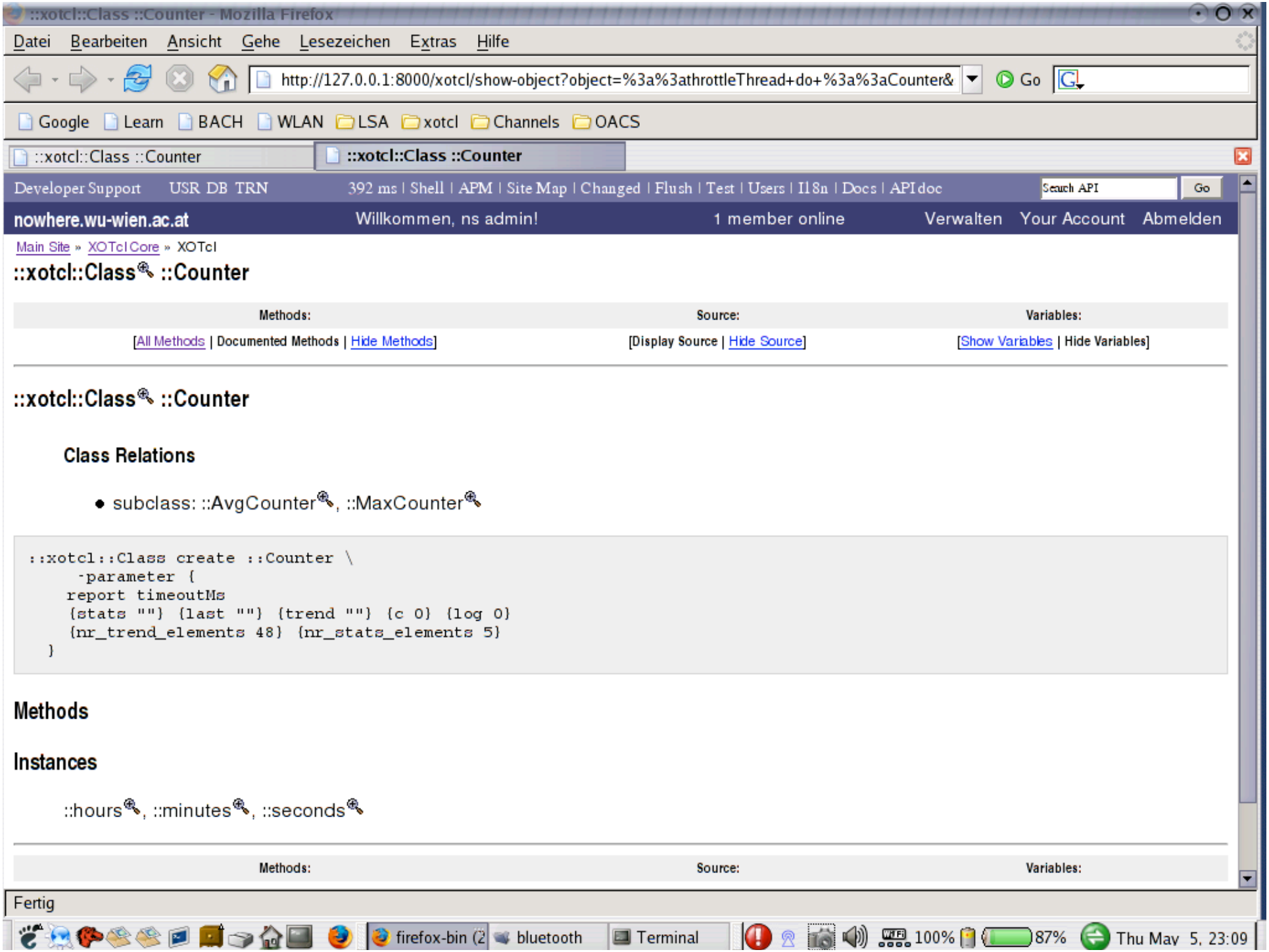
302 285 491 331 280 460 445 431 258 324 359 359 449 387 268 284 269 509 334 254 299 434 345
444 374 345 352 337 491 259 293 443 277 496 356 325 325 303 419 327 238 334 263 593 254 320
328 260

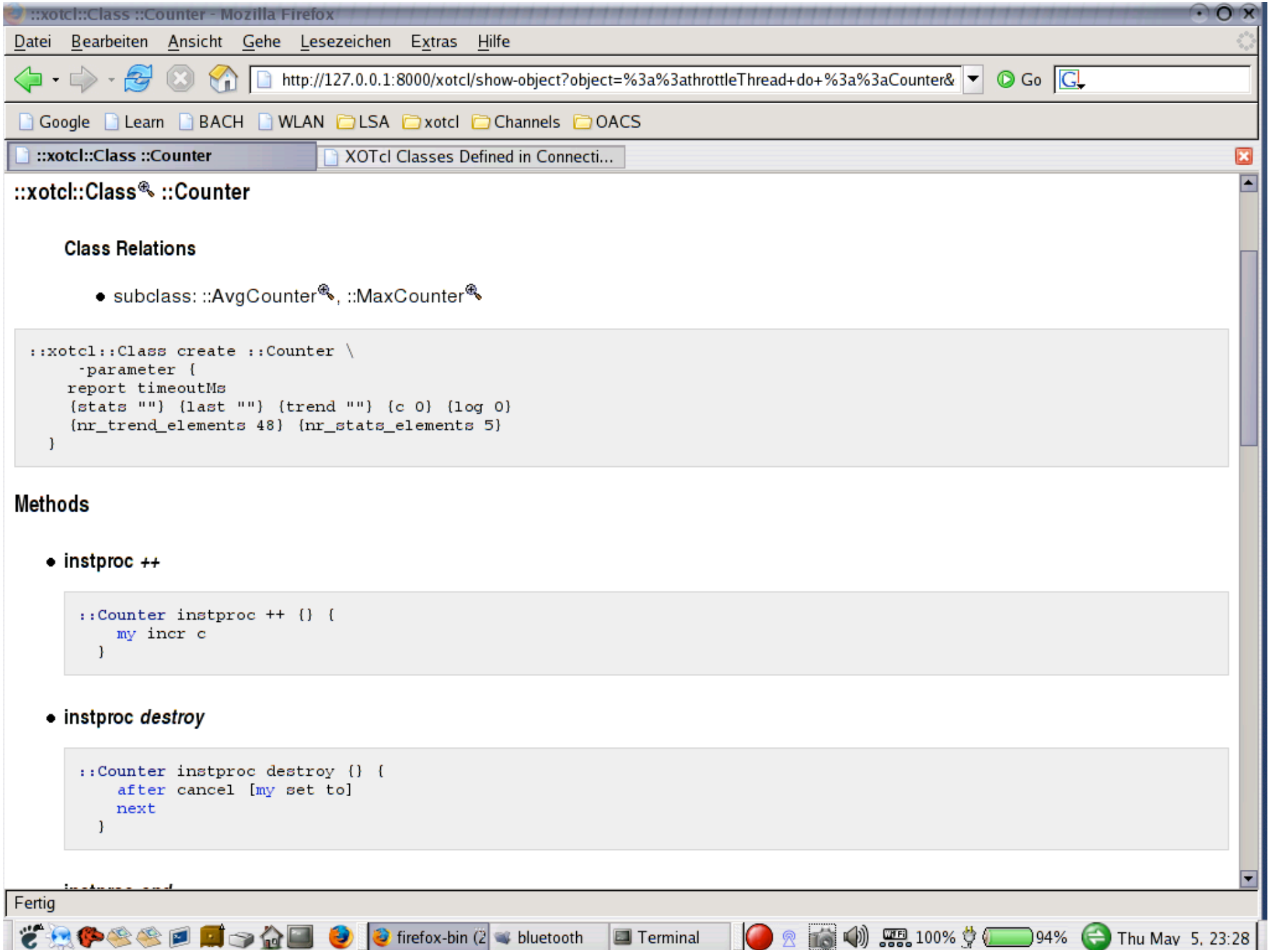
Max

Tue Nov 23 01:31:05 CET 2004	7021
Tue Nov 23 01:09:05 CET 2004	3191
Tue Nov 23 13:50:07 CET 2004	2300
Tue Nov 23 15:04:08 CET 2004	2279
Tue Nov 23 14:59:08 CET 2004	2135
Tue Nov 23 13:47:07 CET 2004	2045

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


::xotcl::Class ::Counter - Mozilla Firefox
Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe
http://127.0.0.1:8000/xotcl/show-object?object=%3a%3athrottleThread+do+%3a%3aCounter&
Go
Google Learn BACH WLAN LSA xotcl Channels OACS
::xotcl::Class ::Counter
::xotcl::Class ::Counter
Developer Support USR DB TRN 392 ms | Shell | APM | Site Map | Changed | Flush | Test | Users | I18n | Docs | APIdoc
Search API
Go
nowhere.wu-wien.ac.at
Willkommen, ns admin!
1 member online
Verwalten
Your Account
Abmelden
Main Site » XOTclCore » XOTcl
::xotcl::Class ::Counter
Methods:
Source:
Variables:
[All Methods | Documented Methods | Hide Methods]
[Display Source | Hide Source]
[Show Variables | Hide Variables]
::xotcl::Class ::Counter
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
Instances
::hours, ::minutes, ::seconds
Methods:
Source:
Variables:
Fertig
firefox-bin
bluetooth
Terminal
100%
87%
Thu May 5, 23:09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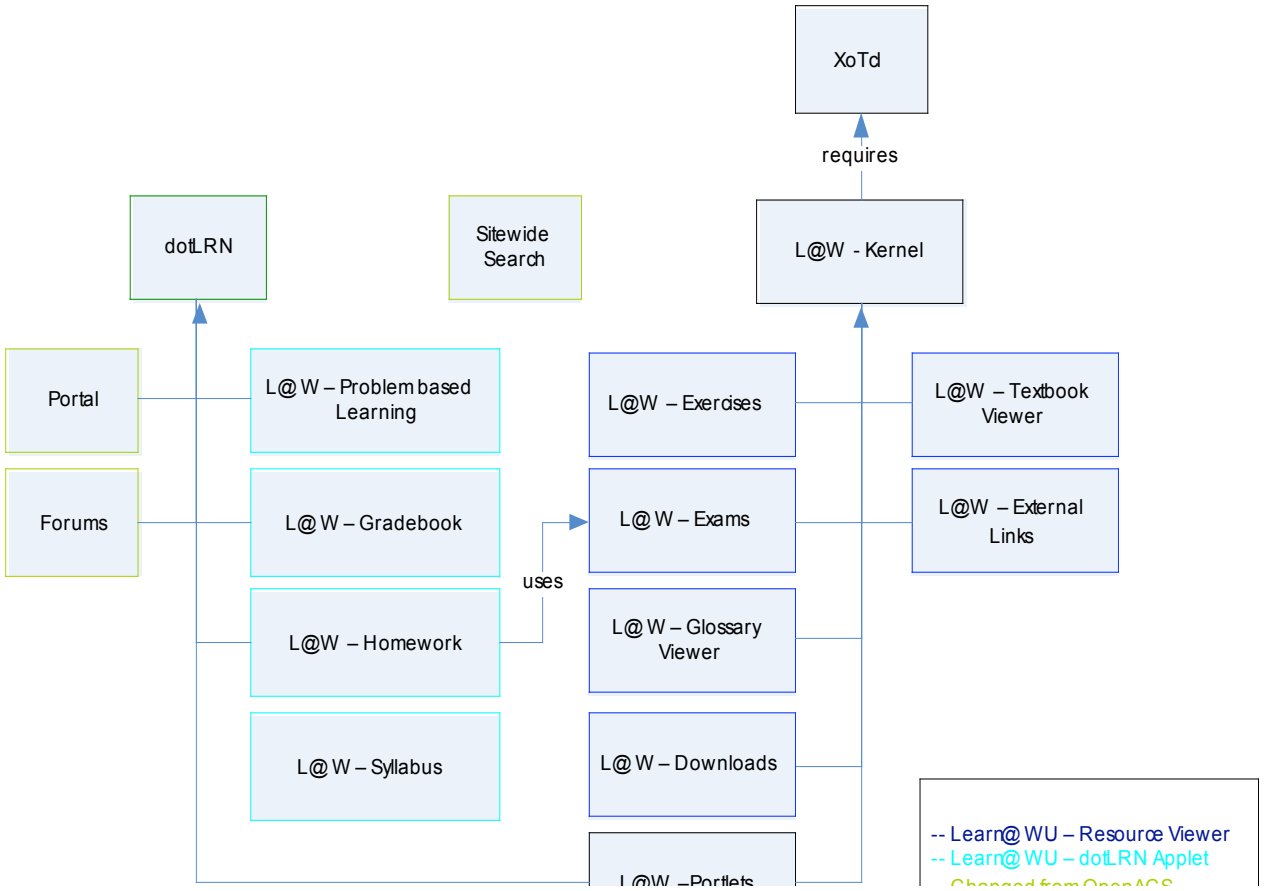
Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe
http://127.0.0.1:8000/xotcl/show-object?object=%3a%3athrottleThread+do+%3a%3aCounter&
Go
Google Learn BACH WLAN LSA xotcl Channels OACS
::xotcl::Class ::Counter
XOTcl Classes Defined in Connecti...
::xotcl::Class ::Counter
Class Relations
subclass: ::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
}
Fertig
firefox-bin
bluetooth
Terminal
100%
94%
Thu May 5, 23:28

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

Learn@WU – Components



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

Suchergebnisse
Volltextsuche : Suchergebnisse

[LV-Information] **Lernressourcen** [Diskussionsforen]

pgp Suche Erweiterte Suche

Suche nach: "pgp" in Lernressourcen Resultate **1-6** von **6**. Die Suche dauerte **0.50** Sekunden.

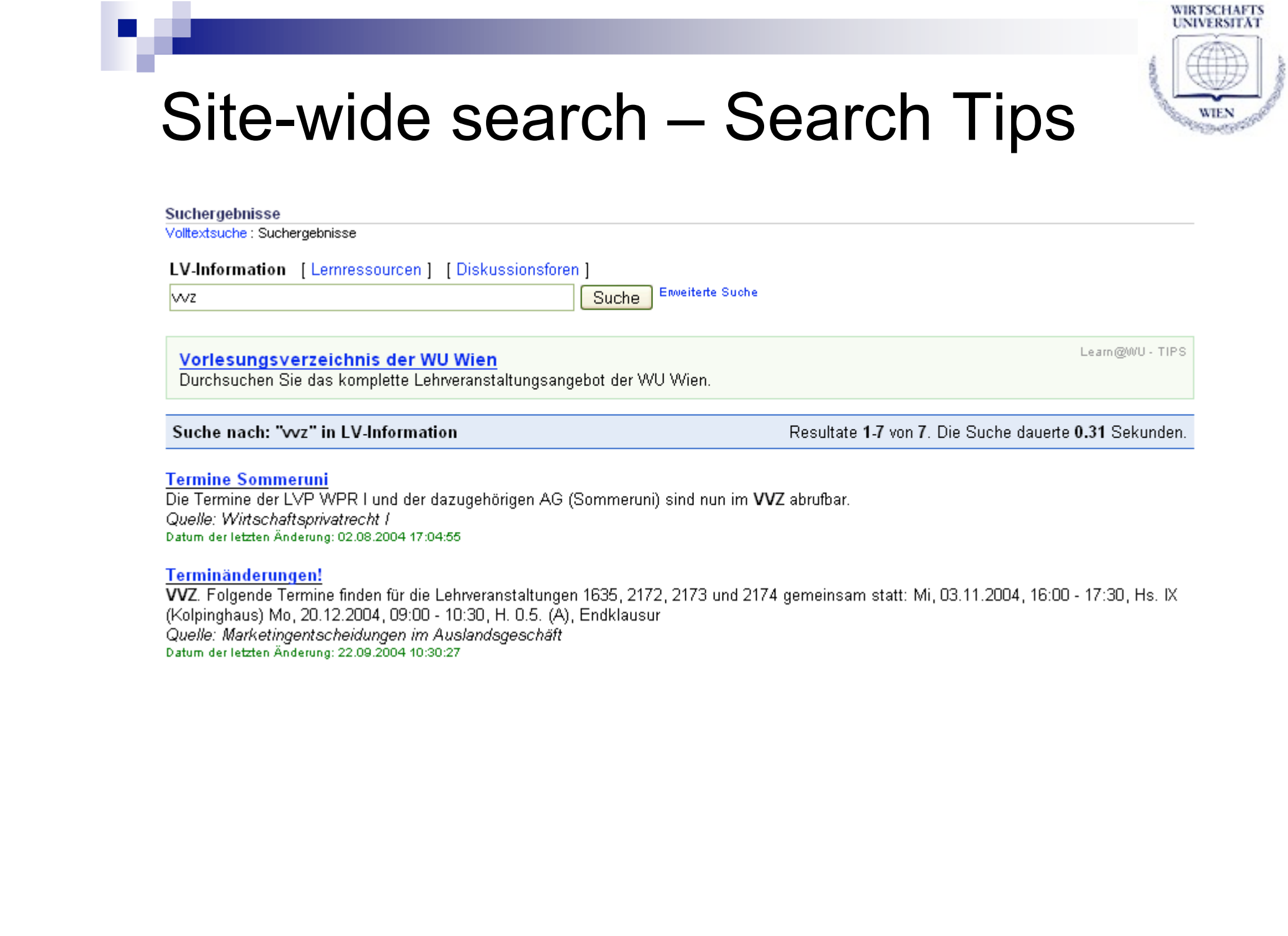
[Definition] **PGP**
Von Phil Zimmermann entwickelte kryptographische Software zur Verschlüsselung von E-Mail und Dateien. Verwendet asymmetrische Algorithmen (RSA), symmetrische Verfahren (DES, IDEA) und Hash-Funktionen (MD5
Quelle: Einführung in betriebliche Informationssysteme
Datum der letzten Änderung: 29.03.2004 11:54:24

Verschlüsselungsmethode
PGP , Schlüssel , Software , Steganographie , Verschlüsselung , asymmetrische Kryptographie , geheimer Schlüssel , symmetrische Kryptographie-Bei der asymmetrischen Kryptographie ist jeweils ein Schlüssel geheim und ein Schlüssel öffentlich. Das Schlüsselpaar
Quelle: Einführung in betriebliche Informationssysteme

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



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.

Aufgabe 1	100.00 Punkte

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] ✗ 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."

Zurücksetzen | Musterlösung

Wie soll dieses Beispiel in Ihrer persönlichen Lernhistorie eingeordnet werden?

Als richtig gelöst | Als falsch gelöst | Nicht vermerken

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   all hours ×
   If you work **all hours**, you work at various times, especially late at night. Details

   3am: her flatmates [are returning] home from t[illegible] [s just getting] out of bed to go to work. Graham, a third-year English and politics [illegible]ike 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 [says]

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Ok

Wie soll dieses Beispiel in Ihrer persönlichen Lernhistorie eingeordnet werden?

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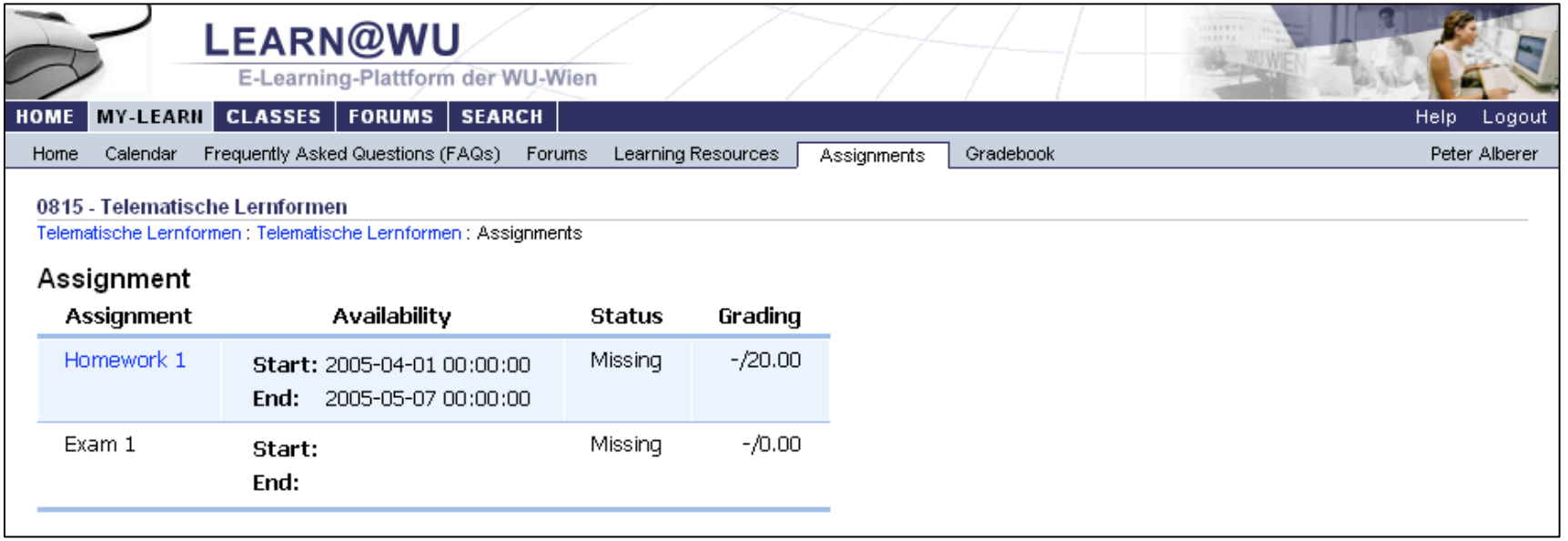
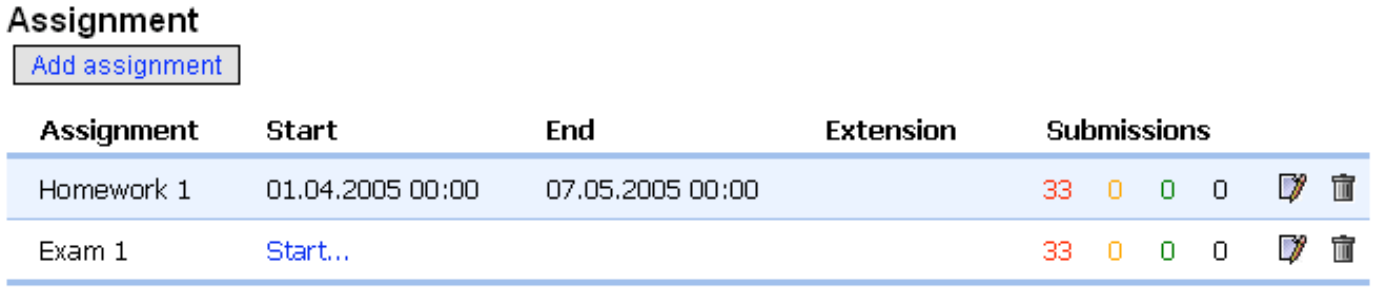
Homework – Students View



Homework – Teachers View



Homework – Teachers View

Edit assignment

1. Properties

Title	Homework 1
Release	(•) Date ( ) Manual
Start	01 . 04 . 2005 00 : 00
End	07 . 05 . 2005 00 : 00
Extension	(•) no ( ) yes
Score release	( ) after assessment of each student (•) after assessment of all students ( ) never

Save Back

2. Tasks

Add text Add exam

	Instructions	Type	Points
#1	Read the attached article	text	20.00
			20.0

3. Extension for certain students

Add extension

Student ID	Name	Extension
No data		

Back

Homework 1

1. Properties

Name	Peter Alberer
Maximum points	20.00
Instructions	Read the attached article

2. Documents

Name	Size	Date
article.zip	171 KB	04.05.2005 18:31

3. Submission

Add submission afterwards Add correction

Name	Size	Date
No data		

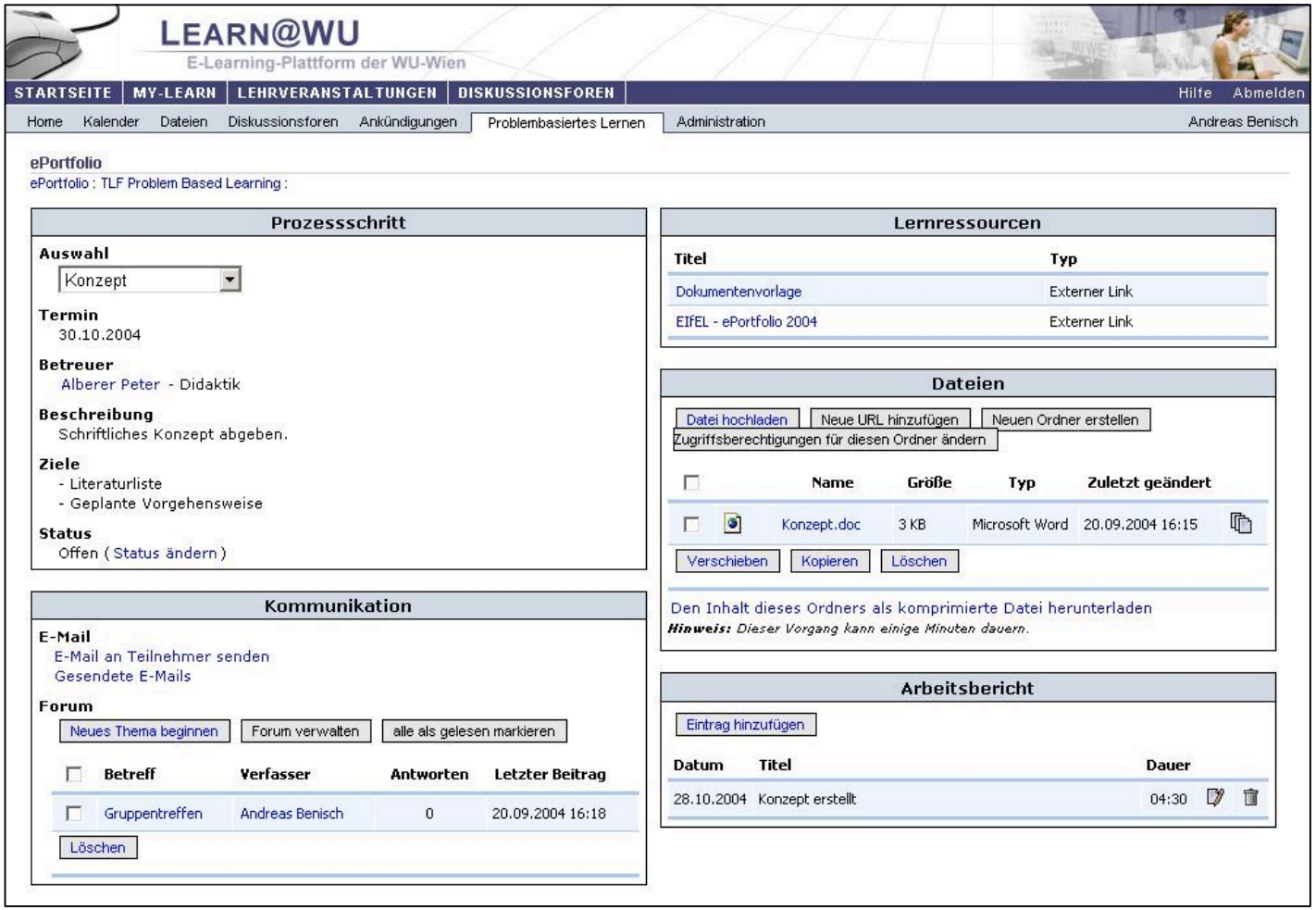
Comment	this is my submission

4. Grading

It is not possible to grade ongoing assignments.

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

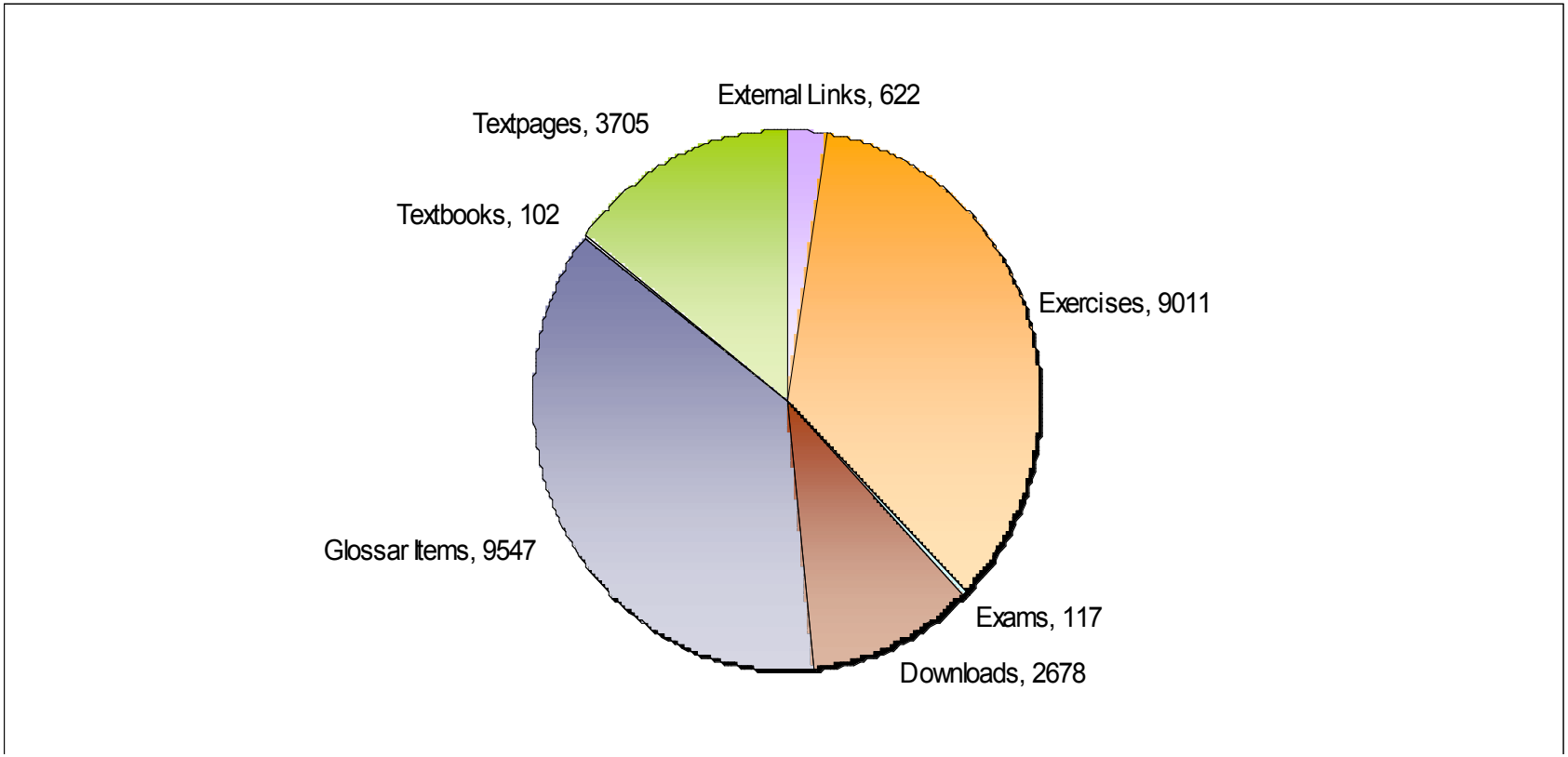
Current Development

- **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 (questionaire in development)
  - Need better integration with universities legacy system

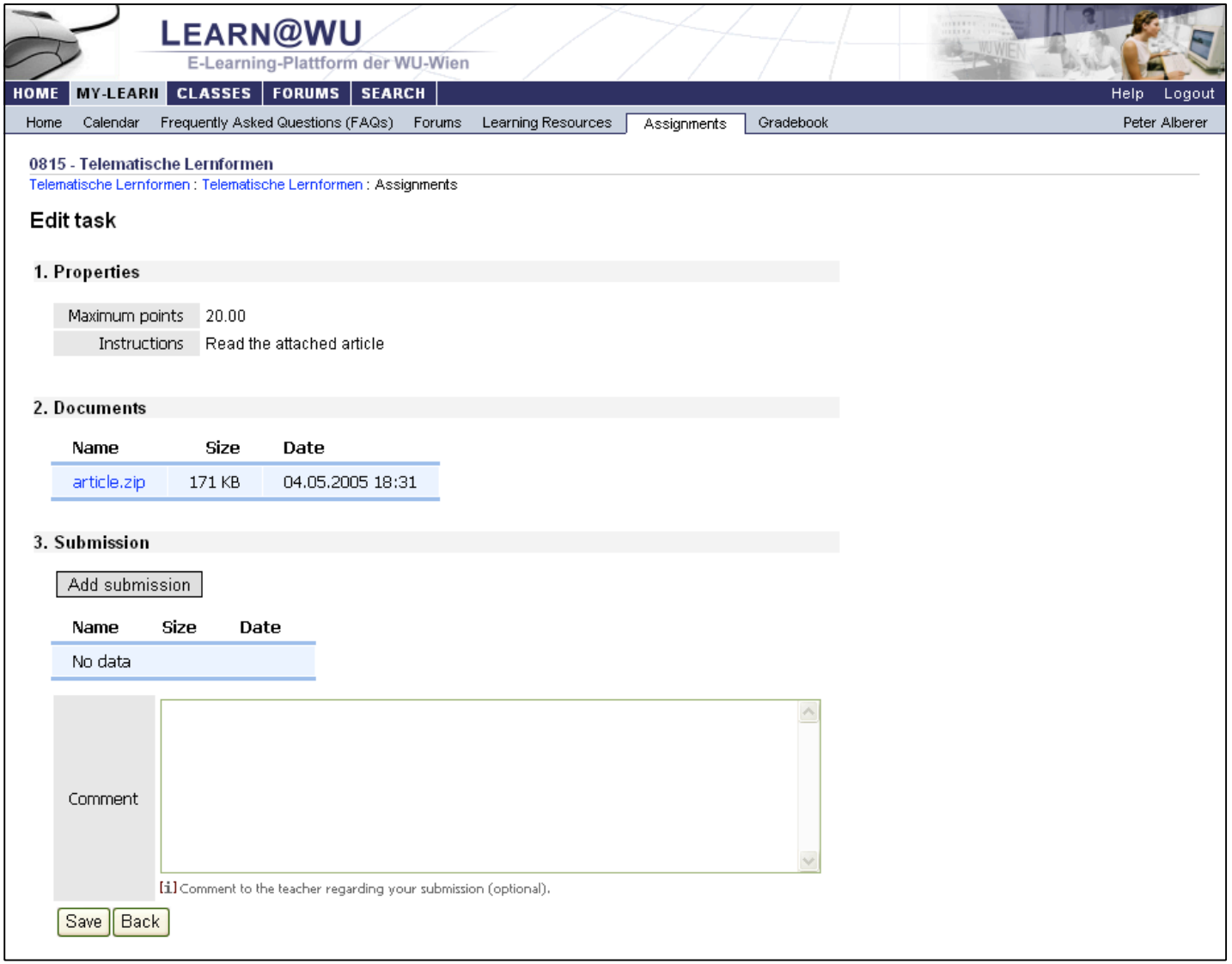
- **Researchy issues**
  - Work on auto-grading of free-text exercises based on LSA

- **Incentive models for learning resource providers (teachers)**

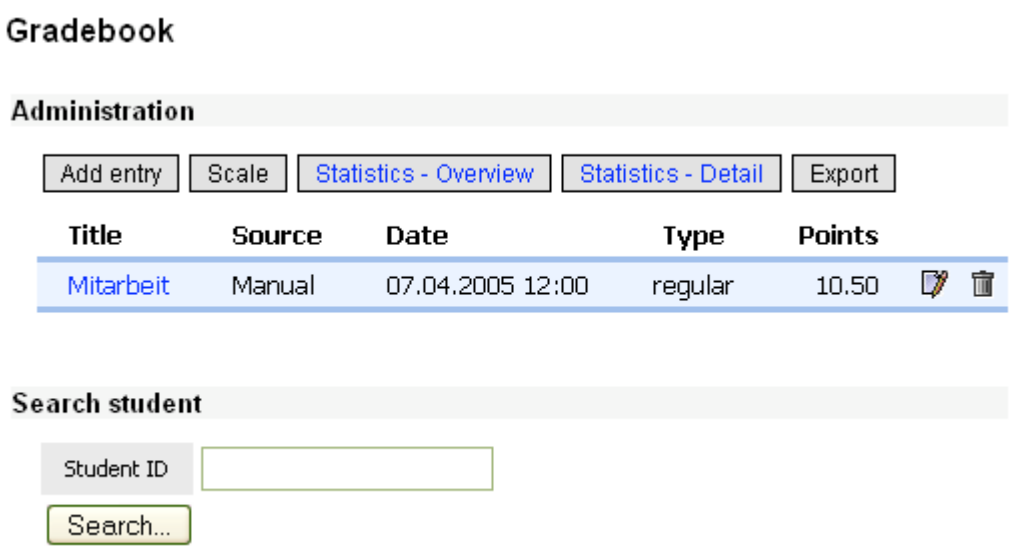
Current system status – learning resources



Homework – students view



Gradebook


Gradebook
Administration
Add entry
Scale
Statistics - Overview
Statistics - Detail
Export
Title
Source
Date
Type
Points
Mitarbeit
Manual
07.04.2005 12:00
regular
10.50
Search student
Student ID
Search...

Gradebook

Mitarbeit

Import scores

	Student ID	Name	Date	Score	Comment	
☐	9351252	Alberer Peter				
☐	0252510	Bachner Florian				
☐	0051862	Berndl Florian				
☐	0250523	Brezanska Jana				
☐	0150938	Cerny Manuela				
☐	0050394	Engelberger Oliver				
☐	0351846	Fellinger Julia				
☐	0252965	Fink Christian				
☐	0252092	Grbovic Tijana				
☐	0250910	Grossebner Therese				
☐	0350358	Habersberger Florian				
☐	0251555	Hartweger Michael				
☐	9952867	Heissenberger Patrick	07.04.2005 12:04	0.25		