VIPRATECH

Our Way to an Online Laboratory Course in Chemical Engineering and Unit Operations

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VS-C – Network for Chemistry Education

Federal Strategic Project in Germany 1999 – 2004

Aims

- network of knowledge modules (*Learning Unit*) for undergraduate studies in chemistry

- LU: 45..60 min ; can be combined to a teaching path

- using a web-based interactive teaching platform

Partners

FIZ Chemie GmbH

- project management
- development of the interactive teaching platform

13 Universities (16 groups)

- creating contents (learning units)
- all chemistry disciplines involved

Usergroups

-undergraduate students in chemistry
-graduate students

Statistic

- 13841 web pages
- 1327 LUs
- 3171 animations
- ....

Technical Chemistry

laboratory course | seminars | lectures

VIPRATECH

Idea: online laboratory course in chemical engineering and unit operations

Aim:
- improve - evaluation of data
- improve - experiment manual
- support - carrying out a real experiment

web-based material - Experiment LUs

web-based manuals

- hardware description
- experimental objectivs
- theoretical backgrounds
- offline experiments
- online experiment
- evaluation of data
- interactive simulation
- self control

remote control experiments

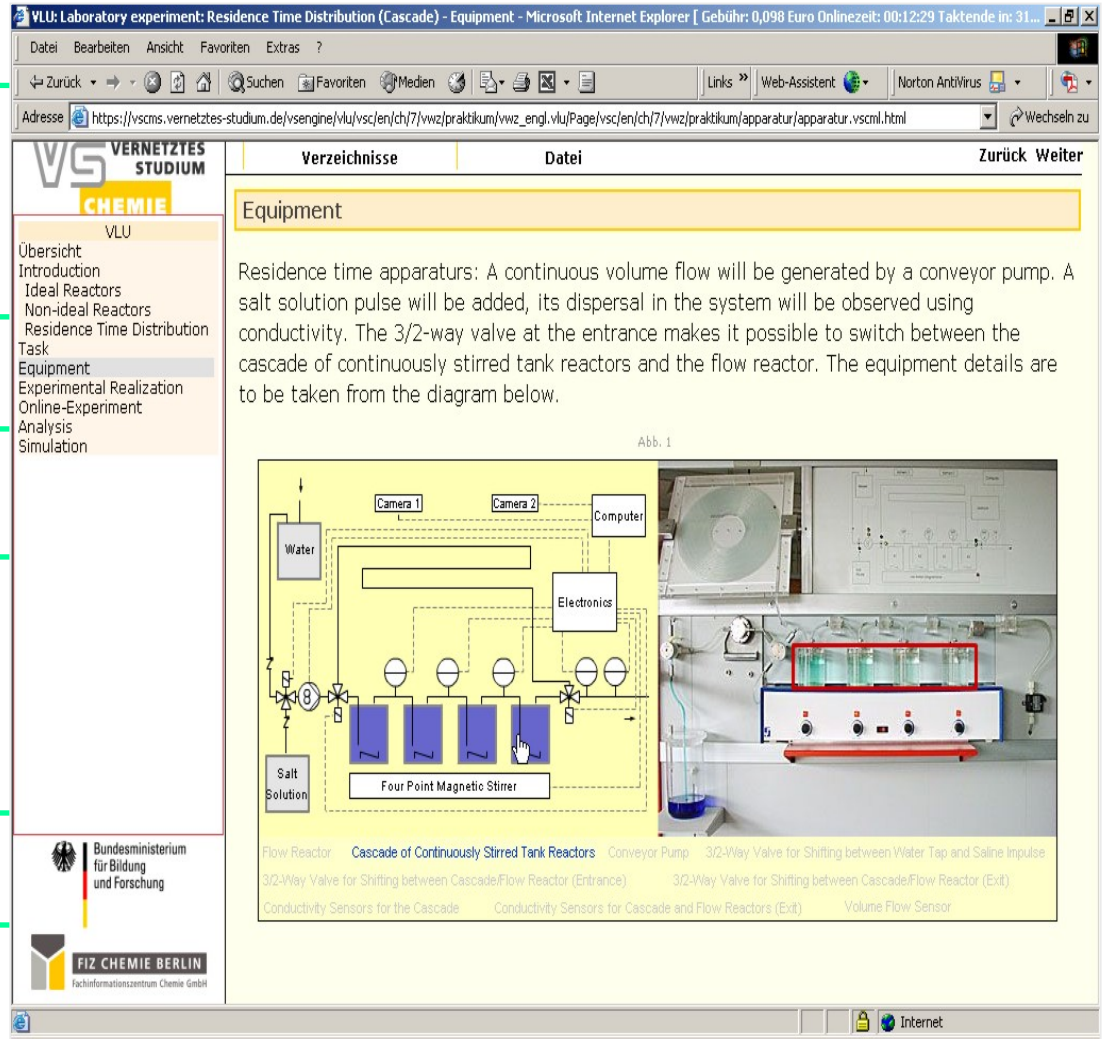
Observe and control an experiment by using a standard web-browser

Advantages

- Sharing expensive lab resources
- Bringing lab experiments into the lecture hall
- Enabling more flexible timetabling of labs
- Sharing resources

Experiment LU

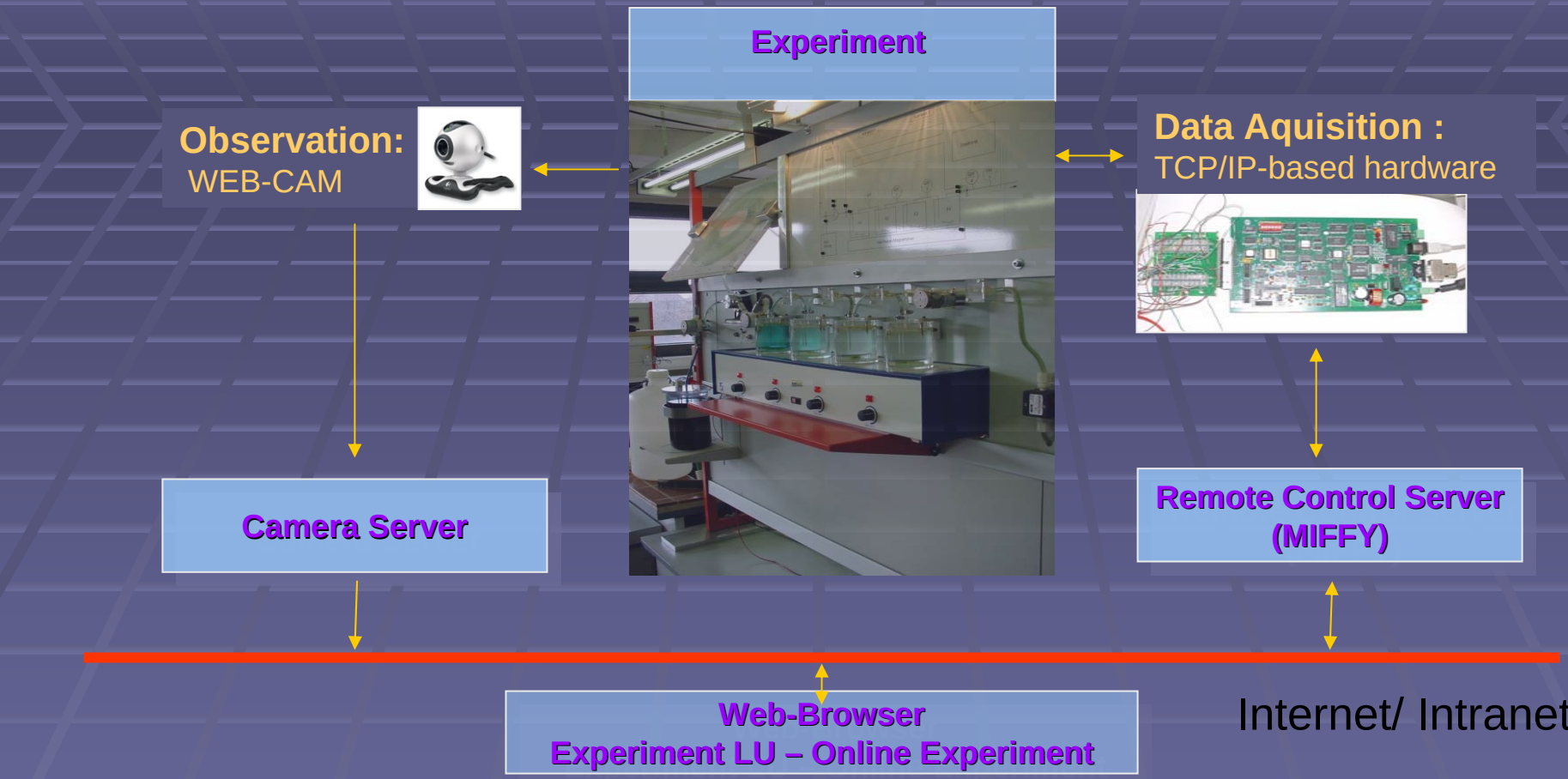
- Introduction
- Experiment Objectives
- Equipment
- Procedure / Offline Exp.
- Online Experiment
- Evaluation / Discussion
- Simulation
- Self-controlling



Online Experiment :

3 web pages:: user management; scheduling; remote access

Remote Control - Single Experiment



- access to distant laboratory equipment (experiment) by VSC Experiment LU
- **Java-Client to control the experiment**:
- Java Bean Library to create Java Clients
- realized: simple scheduling, user management

Online Experiment

Usermanagement

USERDATENBANK

Angemeldet als ralf fuer folgende Versuche :
VWZ-DEMO = super assistant
RES1 = administrator
TEST = administrator
VWZ = administrator
WT = super assistant

LOGOUT

Sortieren nach | userName | Datensatz einfuegen | markierte Daten loeschen | markierte Daten aendern

	username	firstname	familyname	email	group
○	alexander	Alexander	Moros	moros@chemie.uni-leipzig.de	Technical Chemistry
○	brian	Brian	Rous	brian@caret.cam.ac.uk	Caret
○	demo	DEMO User VWZ-passiv	-	moros@chemie.uni-leipzig.de	Technical Chemistry
○	demovwz	DEMO User VWZ	-	moros@chemie.uni-leipzig.de	Technical Chemistry
○	frank	Frank	Luft	luft@chemie.uni-leipzig.de	Technical Chemistry
○	hendrik	Hendrik	Dathe	dathe@organik.chemie.uni-leipzig.de	Technical Chemistry
○	jane	Jane	Moros	jmoros@rz.uni-leipzig.de	Technical Chemistry
○	madhavi	Madhavi	Thottempudi	madhavi@caret.cam.ac.uk	Caret
○	marc	Marc	Liebscher	marc.liebscher@epost.de	Technical Chemistry
○	ralf	Ralf	Moros	moros@organik.chemie.uni-leipzig.de	Technical Chemistry
○	rico	Rico	Rockmann	moros@chemie.uni-leipzig.de	Technical Chemistry
○	warwick	Warwick	Bailey	warwick@caret.cam.ac.uk	Caret

Anzahl der Datensaetze: 12

Scheduling

Username: ralf Versuch:WT

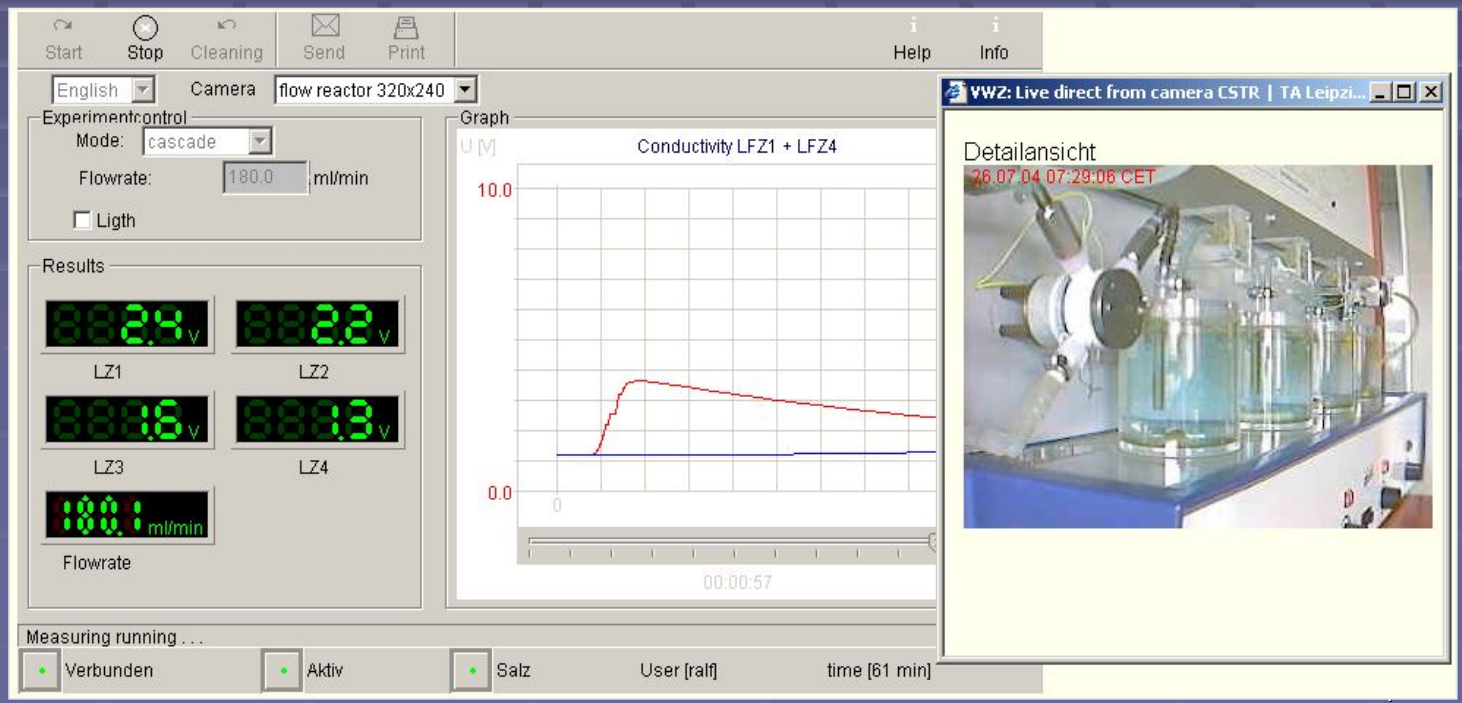
LOGOUT

Monat | Maerz

1-2 3-9 10-16 17-23 24-30 31-31

	Montag 24.3.2003	Dienstag 25.3.2003	Mittwoch 26.3.2003	Donnerstag 27.3.2003	Freitag 28.3.2003	Sonnabend 29.3.2003	Sonntag 30.3.2003
00:00 - 00:30	Frei	Frei	Frei	Frei	Frei	Frei	Frei
00:30 - 01:00	Frei	Frei	Frei	Frei	Frei	Frei	Frei
01:00 - 01:30	Frei	Frei	Frei	Frei	Frei	Frei	Frei
01:30 - 02:00	Frei	Frei	Frei	Frei	Frei	Frei	Frei
02:00 - 02:30	Frei	Frei	Frei	Frei	Frei	Frei	Frei
02:30 - 03:00	Frei	Frei	Frei	Frei	Frei	Frei	Frei
03:00 - 03:30	Frei	Frei	Frei	Frei	Frei	Frei	Frei
03:30 - 04:00	Frei	Frei	Frei	Frei	Frei	Frei	Frei
04:00 - 04:30	Frei	Frei	Frei	Frei	Frei	Frei	Frei
04:30 - 05:00	Frei	Frei	Frei	Frei	Frei	Frei	Frei

Remote access



Lab Provider - Leipzig – 6 Online Exp.

Residence Time Distribution

2001

E-House Demonstration

2002

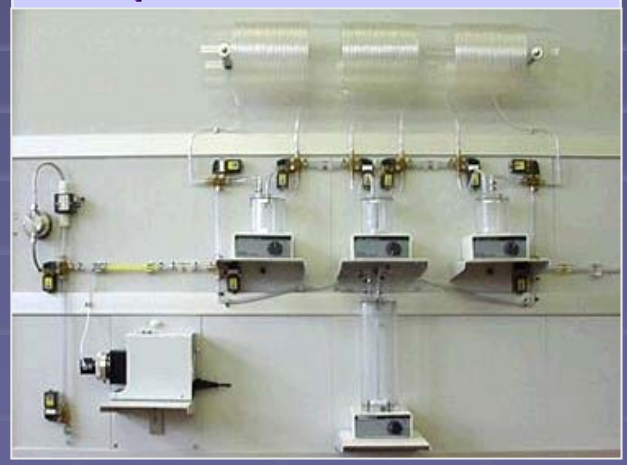
Heat Transfer

2003

Temperature Control Experiment

2004

Saponification of an Ester



2005

Dehydration

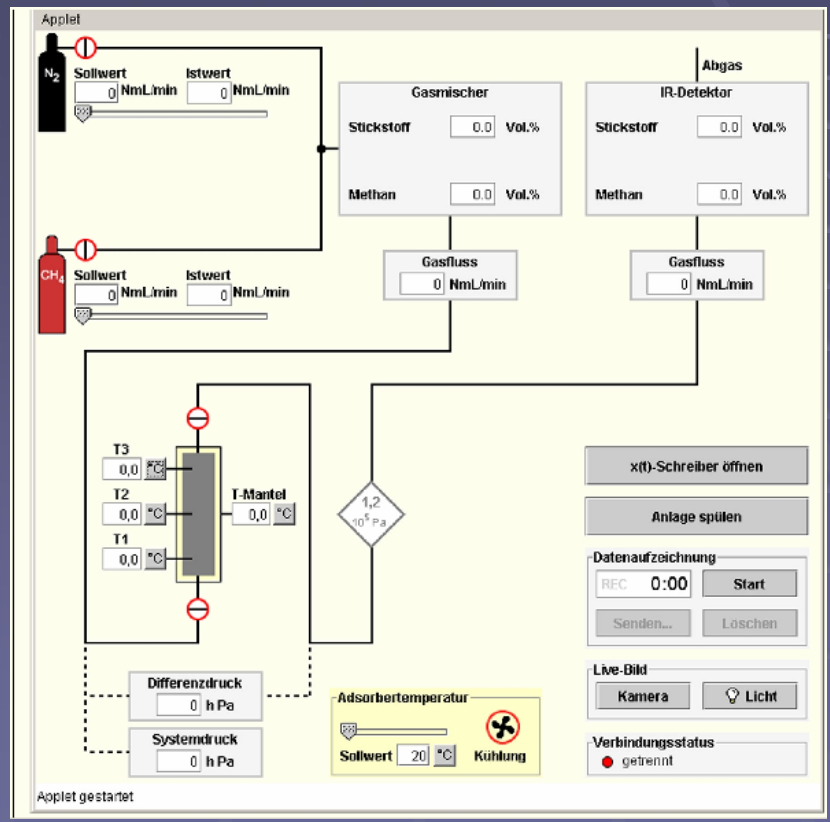
2005

Lab Provider – Oldenburg – 1 Online Exp.

Adsorption

2004

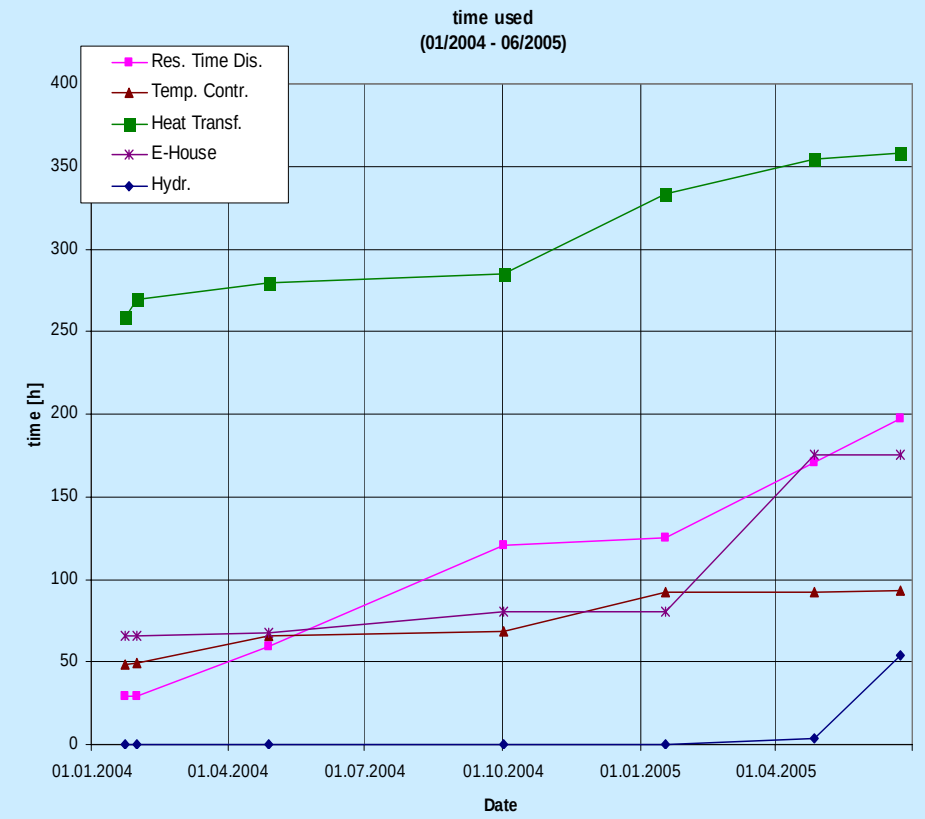
- In 2004 the adsorption experiment has been realized
- aim: building ,testing and analyzing a **network of remote controled experiments**

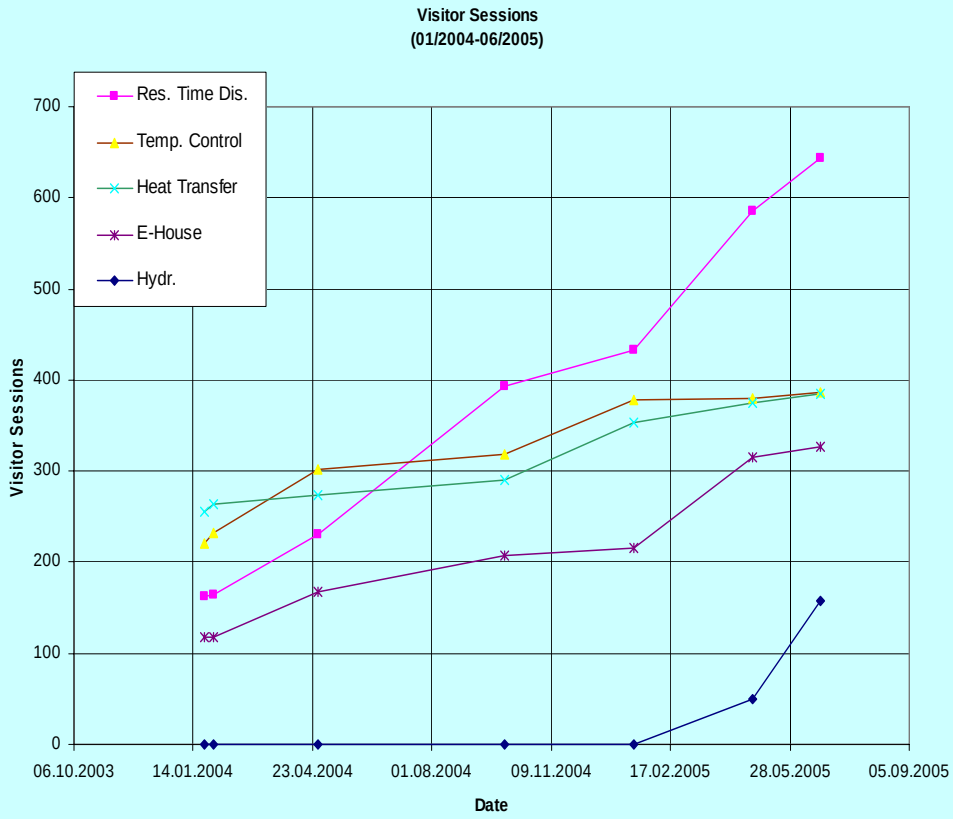


GUI

VIPRATECH: Experiences

- being in use for the last 4 years
- high reliability of servers (MIFFY)
- easy to create servers/clients: Server: 1 day; Client: 4-6 weeks
- Who using it? Students from Leipzig / Oldenburg/..
- most used experiment in 2004 (Leipzig): RTD (2004: 96h, 271 sessions)





VIPRATECH: Experiences

development of a new remotely controlled experiment

What do you need?	Hardware	Software	Staff

Example — Residence Time Distribution Experiment

Hardware:	(Computer) TCP-IP Data Aquisition Hardware (EDAS: 3 T€) Sensors, Actuators, Cameras, ….		15 T€
Software:	MIFFY-Server tomcat-server Apache-server Servlets for User Management Client: Java Applet	(VSC - OS) (OS) (OS) (VSC -OS)	1 day 5 weeks
Staff:	Software Developer Hardware Developer WEB Developer	Applet (Java Beans) Experiment Experiment LU	

VIPRATECH: Experiences

- Problems: no problems with client/server
  - User management/Scheduling if 2 (or more) Lab providers
  - Data storage , Data delivery (e-mails, ftp, download,..)
  - availability (24 hours/day)

  Necessary to outsource service functions

- Next Step: Lab Provider and Service Provider

  Service Provider which provides all service functions -> based on iLab Software

  (user management, scheduling, data storage, data delivery, statistics, billing,..)

Next steps

More Experiments

- create more experiments ; using for automation of lab units

iLab support

- further development of our server in order to support iLab software

Translation

- translation into other languages

Network

- building a network of remote controled experiments (chemical engineering,..)

Funding