

Overview

Four problems and my solution in REXX:

- Stupid maintenance tools
- Monitoring of multiple scripts
- Version tracking
- Card-index program with GUI

Problem: Stupid Tools

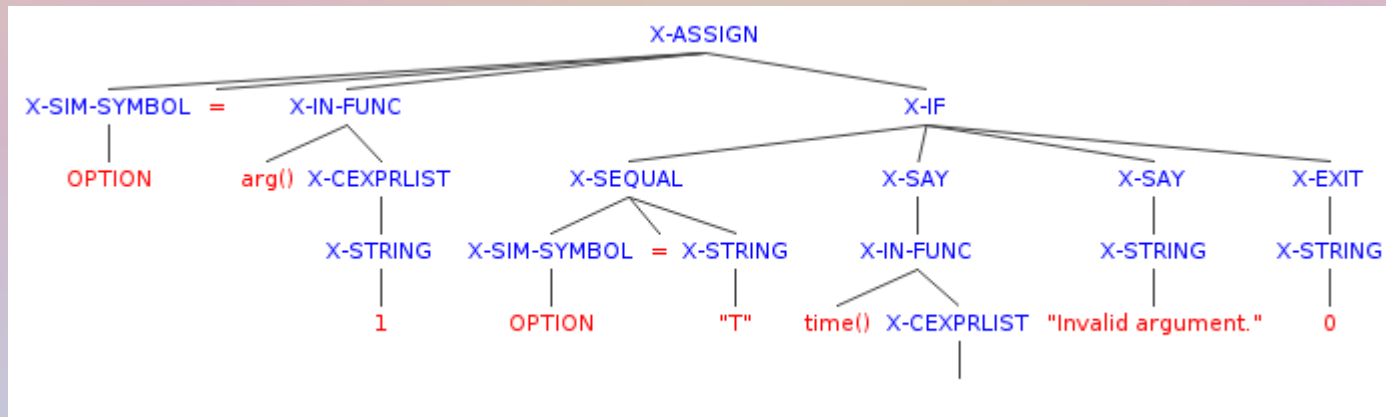
- Millions of source lines with legacy REXX code
- Change requests with target date yesterday
- Available tools can find and replace text pattern but are insensitive for REXX syntax (e.g. line limits, var/func name or statement/literal/comment)
- Review of every change is necessary

Vision of Smart Tools

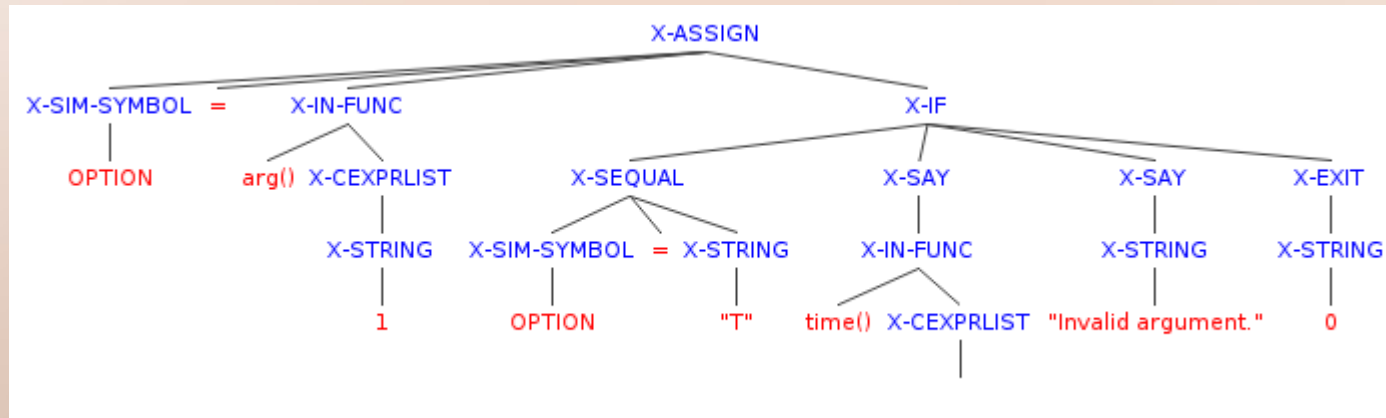
- Use an internal representation (syntax tree) of the source code, for example the RIF (Regina Internal Format produced by „regina -c“) to reduce the syntax variety
- Change the RIF instead of the source code
- Regenerate the source code from RIF (comments need special care, since not part of RIF)
=> Review only needed for the first

REXX Code & Syntax Tree

```
mc [ctbankix@ctbankix]:~  
/home/ct~emo.rex [-M--] 0 L:[ 1+ 4 5/ 5] *(94  
OPTION=arg(1)  
if OPTION="T" then say time()  
else say "Invalid argument."  
exit 0  
1Hilfe 2Sp~rn 3Ma~en 4Er~en 5Ko~en 6Ve~en 7Su~en
```



Syntax Tree & RIF

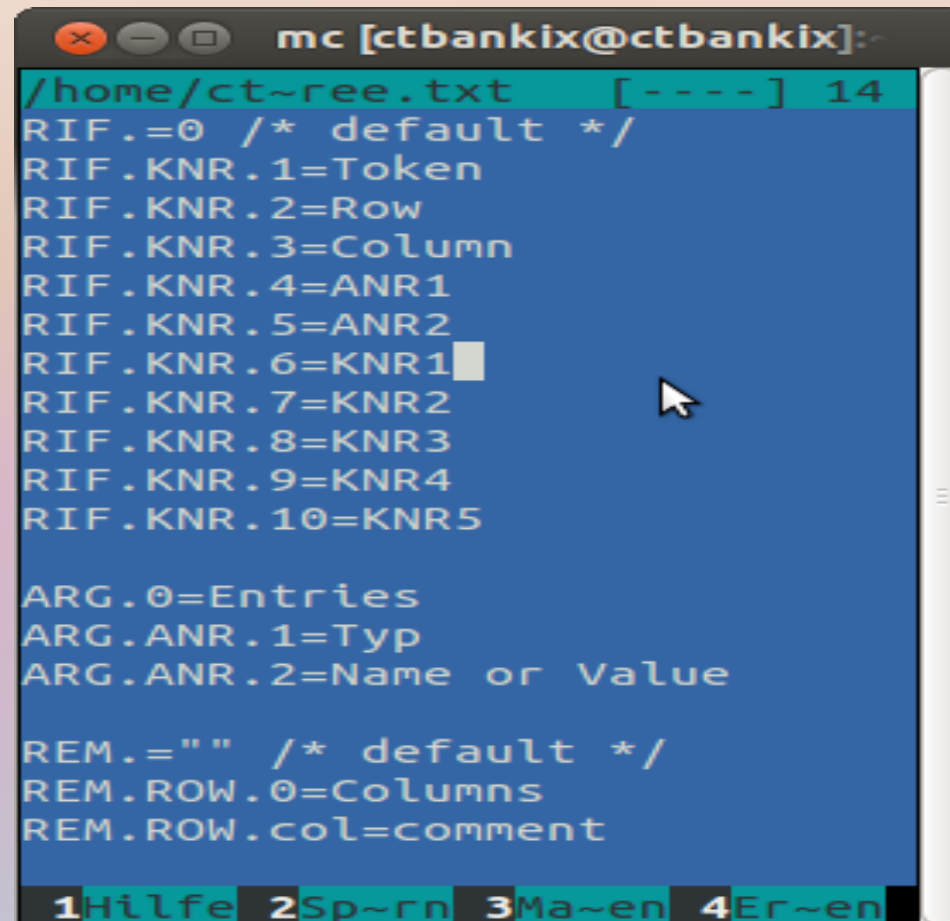


```

ctbankix@ctbankix: ~
Adr  TN  Col  Row  Time  A1  ?  P1  P2  P3  P4  A2  PX  KNR  X_ASSIGN  $0=$1
000011C 3A 00000001 00000001 00000000 00000000 00000000 00000001 00000004 ***** ***** 00000000 00000005 00000000 X_ASSIGN $0=$1
0000150 4D ***** ***** 00000000 0000045C 00000000 ***** ***** ***** ***** 00000000 ***** 00000001 X_SIM_SYMBOL $1_$2
0000184 4F ***** ***** 00000000 00000468 00000000 ***** ***** ***** ***** 00000000 ***** 00000002 X_STRING $0
00001B8 79 ***** ***** 00000000 00000000 00000000 00000002 ***** ***** ***** ***** 00000470 ***** 00000003 X_CEXPRLIST $1
00001EC 55 ***** ***** 00000000 00000478 00000000 00000003 ***** ***** ***** ***** 00000000 ***** 00000004 X_IN_FUNC $0($1)
0000220 13 00000001 00000002 00000000 00000000 00000000 00000008 00000009 0000000C ***** 00000000 0000000E 00000005 X_IF IF_$1_THEN_$2_ELSE_$3
0000254 4D ***** ***** 00000000 00000480 00000000 ***** ***** ***** ***** 00000000 ***** 00000006 X_SIM_SYMBOL $1_$2
0000288 4F ***** ***** 00000000 0000048C 00000000 ***** ***** ***** ***** 00000000 ***** 00000007 X_STRING $0
00002BC 6C ***** ***** 00000000 00000000 00000000 00000006 00000007 ***** ***** 00000000 ***** 00000008 X_SEQUAL $1=$2
00002F0 2A 00000020 00000002 00000000 00000000 00000000 0000000B ***** ***** ***** ***** 00000000 ***** 00000009 X_SAY SAY_$1
0000324 79 ***** ***** 00000000 00000000 00000000 ***** ***** ***** ***** 00000000 ***** 0000000A X_CEXPRLIST $1
0000358 55 ***** ***** 00000000 00000494 00000000 0000000A ***** ***** ***** ***** 00000000 ***** 0000000B X_IN_FUNC $0($1)
000038C 2A 00000020 00000003 00000000 00000000 00000000 0000000D ***** ***** ***** ***** 00000000 ***** 0000000C X_SAY SAY_$1
00003C0 4F ***** ***** 00000000 000004A0 00000000 ***** ***** ***** ***** 00000000 ***** 0000000D X_STRING $0
00003F4 12 00000001 00000004 00000000 00000000 00000000 0000000F ***** ***** ***** ***** 00000000 ***** 0000000E X_EXIT EXIT_$0
0000428 4F ***** ***** 00000000 000004B8 00000000 ***** ***** ***** ***** 00000000 ***** 0000000F X_STRING $0

Adr  Len  String
0000045C 00000006 OPTION
00000468 00000001 1
00000470 00000001 1
00000478 00000003 ARG
00000480 00000006 OPTION
0000048C 00000001 T
00000494 00000004 TIME
000004A0 00000011 Invalid argument.
000004B8 00000001 0
ctbankix@ctbankix:~$
  
```

Tree in Stem Variables



```
mc [ctbankix@ctbankix]:  
/home/ct~ree.txt [----] 14  
RIF.=0 /* default */  
RIF.KNR.1=Token  
RIF.KNR.2=Row  
RIF.KNR.3=Column  
RIF.KNR.4=ANR1  
RIF.KNR.5=ANR2  
RIF.KNR.6=KNR1  
RIF.KNR.7=KNR2  
RIF.KNR.8=KNR3  
RIF.KNR.9=KNR4  
RIF.KNR.10=KNR5  
  
ARG.0=Entries  
ARG.ANR.1=Typ  
ARG.ANR.2=Name or Value  
  
REM.=" " /* default */  
REM.ROW.0=Columns  
REM.ROW.col=comment  
  
1Hilfe 2Sp~rn 3Ma~en 4Er~en
```


Usage Cases

- Source code reformatting/highlighting
- Automatic code changes for the mass
- References (usage of variables and functions)
- Forecast of runtime errors
- Enforcement of Coding Standards
- Functional compare (RIF level)

Problem: Monitoring of REXX scripts

- Needed to automate daily online activities (E-Mail, Newsgroups, Website / Stock Exchange Monitor, periodical download of files, ...)
- Trigger was one big script which executes many tasks step by step
- Problems: dependencies, error handling, partial restart, required delays, debugging

Solution: Monitor of REXX scripts

- One script, but tasks will be started via `fork()` as child process when conditions are complied
- Monitoring of process IDs (pid)
- Common used logs (`stderr/stdout`) with synchronized write access controlled by mutex semaphores (regutil extension)
- Task specific parameter/status files
- Restart/Repeat at any time

Process Monitoring

```
ctbankix@ctbankix: ~
forkdemo.rex  [----] 51 L:[ 1+ 0 1/ 32] *(51 /1015b) 0010 0x00A
/* REXX Demo fork() and monitor end of processes */
CHILDREN=""
do TASK=1 to 10 /* 10 children */
  MAX=random(10); PID=fork()
  select
    when PID=0 then do
      CHILD=getpid()
      do N=1 to MAX.
        TMP=sleep(2); say "Task "||TASK||" loop "||N||"/"||MAX||" pid="||CHILD
      end
      say "End of Task "||TASK; address system "touch /tmp/eop"||CHILD
      exit /* exit child process */
    end
    when PID>0 then do
      /* continue parent process */
      say 'Task '||PID||' was started.'; CHILDREN=CHILDREN||' '||PID
    end
    otherwise.
      TMP=lineout("stderr","Start of child "||PID||" was not sucessfully.")
    end
  end
end
do while words(CHILDREN)>0
  TMP=sleep(1); say "Waiting for pids "||CHILDREN
  do I=words(CHILDREN) to 1 by -1
    PID=word(CHILDREN,I)
    if length(stream("/tmp/eop"||PID,'C',"QUERY EXISTS"))>0 then do
      CHILDREN=delword(CHILDREN,I,1); address system "rm /tmp/eop"||PID
    end
  end
end
end
say "End of Demo"
exit 0
1Hilfe 2Spei-ern 3Mark-ren 4Ersetzen 5Kopieren 6Vers-ben 7Suchen 8Löschen 9Menüs 10Beenden
```

Common Logs

```
mc [ctbankix@ctbankix]:~/Documents
/home/ct-gger.rex [-M--] 25 L:[ 1+ 6 7/ 26] *(308 / 896b) 0010 0x00A
/* REXX Test Mutex Semaphore */
if rxfuncquery('SYSLoadFuncs')=1 then ,
  if rxfuncadd('SYSLoadFuncs','regutil','SYSLoadFuncs')>0 then exit
call sysloadfuncs; semid=syscreatemutexsem('LOG')
if length(semid)>0 then do /* Logger semphor established */
  do i=1 to 10 /* 10 childs */
    if fork()=0 then do
      semid=sysopenmutexsem('LOG')
      if semid<>0 then do i=1 to 5
        XRC=sysrequestmutexsem(semid,)
        if XRC=0 then do.
          say "Message "||i||" from "||getpid()||" at "||time('E');.
          call payload; XRC=sysreleasemutexsem(semid) /* should be 0 */
        end
      end
    else TMP=lineout('stderr',getpid()||" No semid.")
    exit
  end
end
TMP=sleep(15); XRC=sysclosemutexsem(semid) /* XRC should be 0 */
end; TMP=rxfuncdrop('SYSLoadFuncs'); exit 0

1Hilfe 2Spe~rn 3Mar~en 4Ers~en 5Kop~en 6Ver~en 7Suchen 8Lös~en 9Menüs 10Bee~en
```

Problem: Version Chaos

- Serveral computers, not connected via LAN or switched on at the same time
- One script in serveral versions !!!? :-)

=> Version repository on USB-Stick

Version Repository

```
mc [ctbankix@ctbankix]:/media/1C66-A0F9/.ctbankix
download.rer 413/46504 0%
#!/usr/bin/env regina
/*#include <irs.rexx>*/; LIBPATH='/media/52D2-CF3E/IRS/'; parse arg astring; parse
source . . quelle; if length(stream(LIBPATH||'IRS.rex','C','QUERY EXISTS'))>0
then interpret "tmprx="||LIBPATH||"IRS'(quelle)"; else tmprx=IRS(quelle); cmdstr='
'||tmprx||' '||astring; errlog=tmprx||'.stderr'; address REXX cmdstr with
error stream errlog; exit .RS
/* REXX Multiscrypt Monitor Version 2 */
1Hilfe 2KeinZU 3Bee~en 4Hex 5GeheZu 6 7Suchen 8Roh 9Format10Bee~en
```

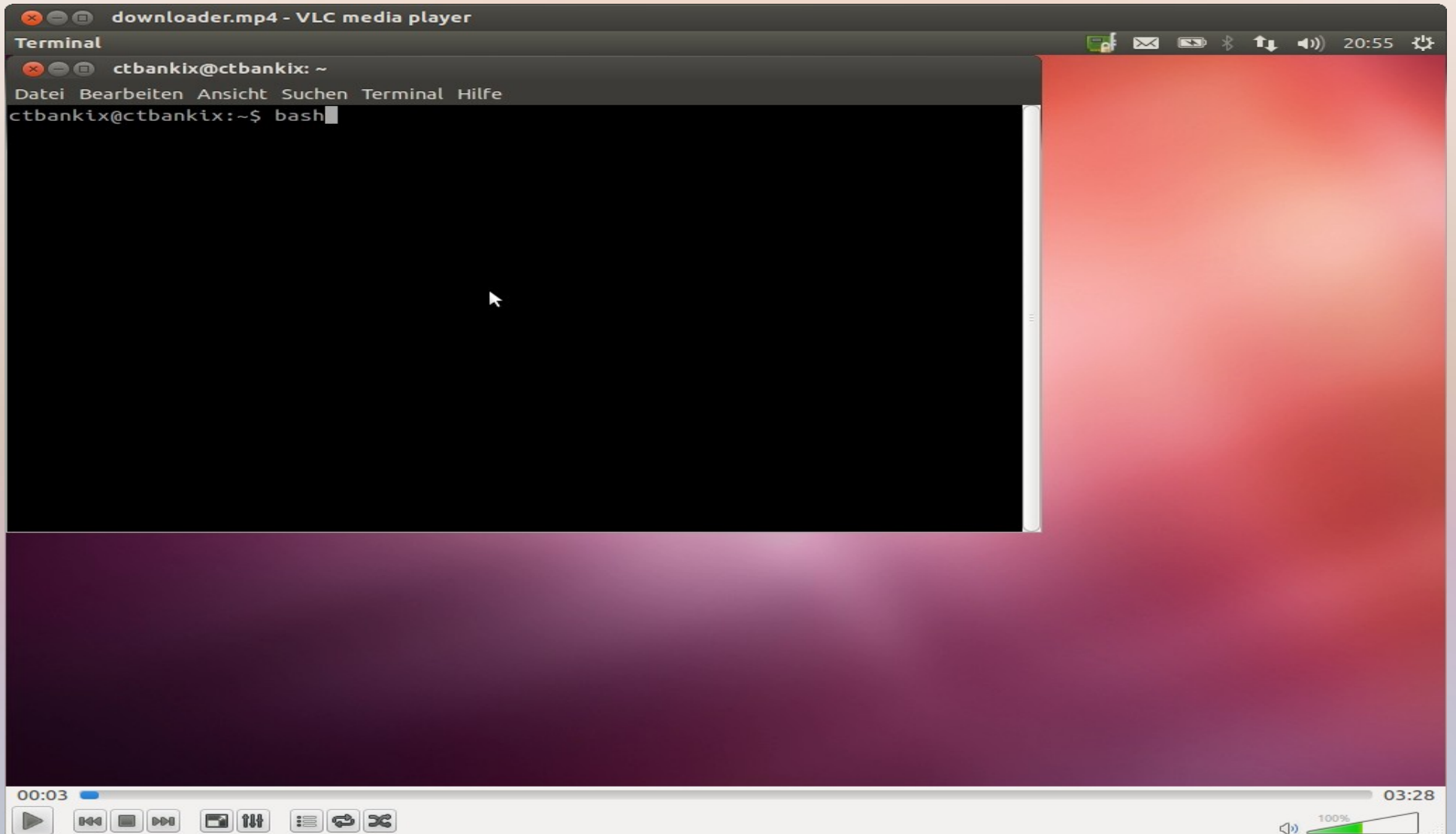
```
mc [ctbankix@ctbankix]:/media/1C66-A0F9/.ctbankix
/media/1~der.rer [----] 52 L:[1335+ 8 1343/1347] *(46356/46504b) 0116 0x074
/*~~INCLUDES~~*/
/* minimal internal IRS routine */
IRS: procedure
parse arg origin;
origin.0=1; origin.1="#!/usr/bin/env regina"
origin.2="/* REXX - placeholder for IRS header code */"
cmdstr="tail -n +3"
address system cmdstr with input stream origin output append stem origin.
rx="/tmp"||substr(origin,lastpos('/',origin))
address system "cat" with input stem origin. output replace stream rx
return rx
1Hilfe 2Spe~rn 3Mar~en 4Ers~en 5Kop~en 6Ver~en 7Suchen 8Lös~en 9Menüs 10Bee~en
```

Version Repository

With a repository available the external version of IRS() will be called and does additionally

- Archive source code (if newer than repository)
- Refresh source code (if older than repository)
- Resolve/Replace includes of common used subroutines
- Execute the result

Demo



Problem: Learning with card-files

- Excellent principle to learn something by repeating (three queues: pending, wrong and ready), but:
 - Only a few programs are for Linux and free
 - Often specialized of one topic and a very restricted selection of questions
 - Best training effect, if you create your own questions and answers while reading the course book

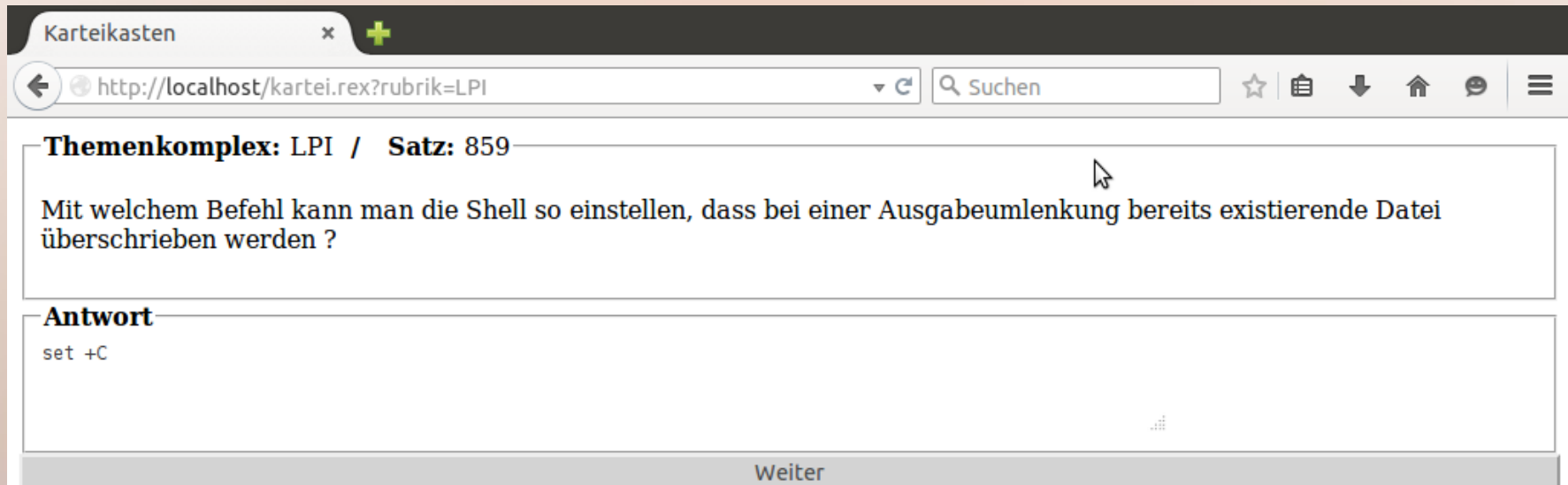
REXX Solution

- multimedia support (charsets, colours, sound and so on) from any Webbrowser
- Apache with modrexr as web server
- MySQL / REXXSQL to store the questions, solutions and results
- REXX logic to create HTML code and evaluate the answers

Parameter Specification

- For questions: HTML mark-up (also sound)
- For solutions:
 - Alternatives (Brackets, AND, OR)
 - Compare based on words of any order or strings
 - Case sensitive or case insensitive
 - ASCII transcription for IPA characters

Sample: Question



The screenshot shows a web browser window with a single tab titled "Karteikasten". The address bar contains the URL "http://localhost/kartei.rex?rubrik=LPI". The page content is divided into two main sections:

Themenkomplex: LPI / Satz: 859

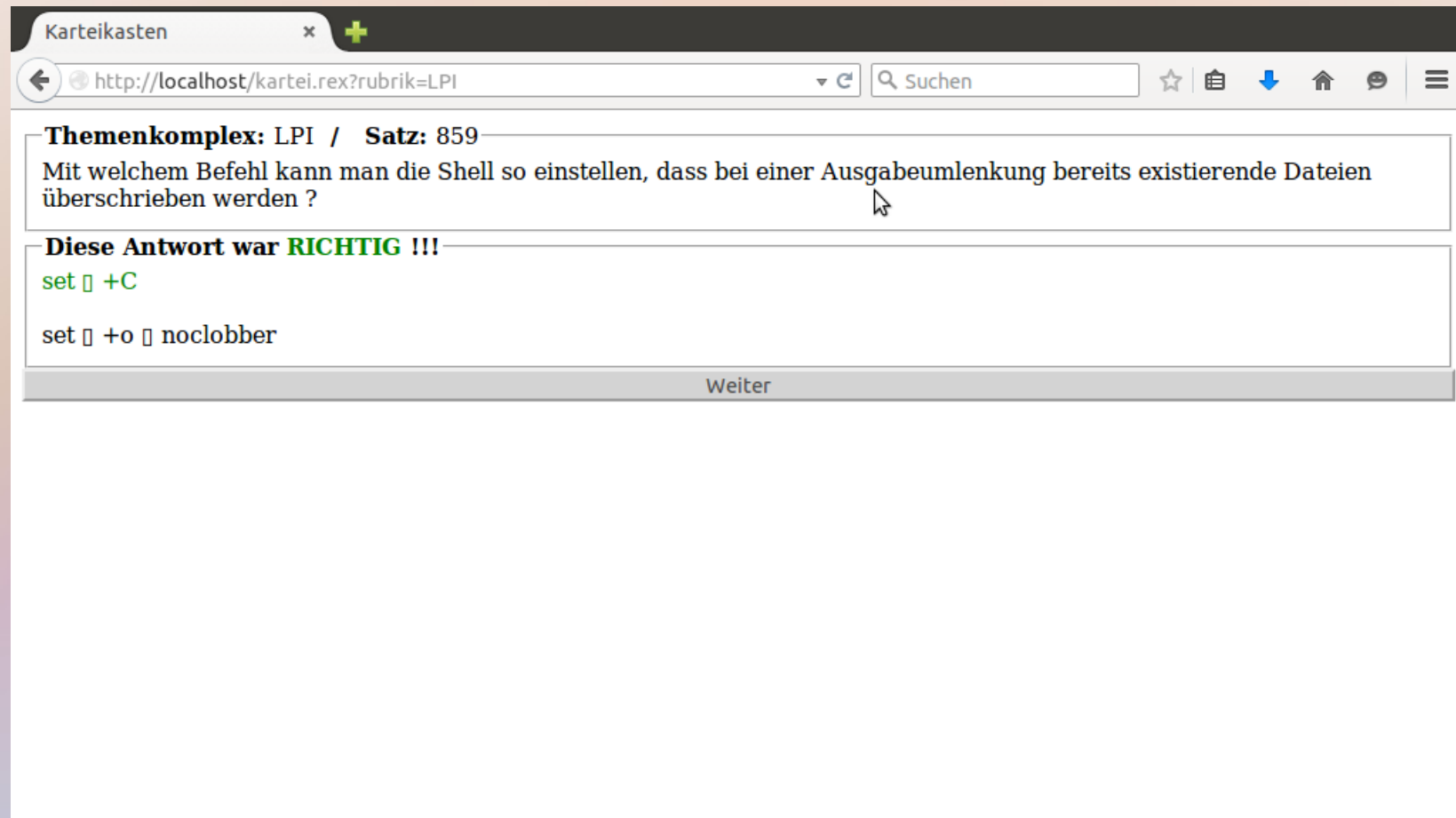
Mit welchem Befehl kann man die Shell so einstellen, dass bei einer Ausgabeumlenkung bereits existierende Datei überschrieben werden ?

Antwort

set +C

At the bottom of the content area, there is a grey button labeled "Weiter".

Sample: Answer



The screenshot shows a web browser window with the following content:

- Tab: Karteikasten
- Address bar: http://localhost/kartei.rex?rubrik=LPI
- Search bar: Suchen
- Question: **Themenkomplex: LPI / Satz: 859**
Mit welchem Befehl kann man die Shell so einstellen, dass bei einer Ausgabeumlenkung bereits existierende Dateien überschrieben werden ?
- Answer: **Diese Antwort war RICHTIG !!!**
set +C
set +o noclobber
- Next button: Weiter

Sample: Question



The screenshot shows a web browser window with the following elements:

- Browser Tab:** "Karteikasten" with a close button (x) and a plus sign (+).
- Address Bar:** "http://localhost/kartei.rex?rubrik=LPI" with a search icon and a search box containing "Suchen".
- Navigation Bar:** Includes icons for back, forward, home, and search.
- Question Section:**
 - Header:** "Themenkomplex: LPI / Satz: 859"
 - Text:** "Mit welchem Befehl kann man die Shell so einstellen, dass bei einer Ausgabeumlenkung bereits existierende Dateien überschrieben werden ?"
- Answer Section:**
 - Header:** "Antwort"
 - Text:** "set +o"
- Footer:** A button labeled "Weiter" (Next).

Sample: Answer



The screenshot shows a web browser window with the title "Karteikasten" and a single tab. The address bar contains the URL "http://localhost/kartei.rex?rubrik=LPI". The search bar is empty with the placeholder text "Suchen". The main content area displays a quiz question in a box: "Themenkomplex: LPI / Satz: 859" followed by "Mit welchem Befehl kann man die Shell so einstellen, dass bei einer Ausgabeumlenkung bereits existierende Dateien überschrieben werden?". Below the question, another box indicates that the user's answer was incorrect: "Diese Antwort war **FALSCH** !!!". The user's answer is shown in red text: "set +o", "set | +o | noclobber", and "set | +C". At the bottom of the content area, there is a grey button labeled "Weiter".

Karteikasten x +

http://localhost/kartei.rex?rubrik=LPI Suchen

Themenkomplex: LPI / Satz: 859
Mit welchem Befehl kann man die Shell so einstellen, dass bei einer Ausgabeumlenkung bereits existierende Dateien überschrieben werden ?

Diese Antwort war **FALSCH !!!**

set +o
set | +o | noclobber
set | +C

Weiter

Multiple Choice

The screenshot shows a web browser window with the following content:

- Tab: Karteikasten
- Address bar: <http://localhost/kartei.rex?rubrik=LPI>
- Search bar: Suchen
- Question: **Themenkomplex: LPI / Satz: 829**
Welche der folgenden Signale können vom Prozess nicht ignoriert bzw. abgefangen werden ?
- Options:
 - a) SIGKILL
 - b) SIGTERM
 - c) SIGSTOP
 - d) SIGTSTP
- Feedback: **Diese Antwort war RICHTIG !!!**
- Answer: a c
- Next button: Weiter

Thank you

- Any Questions ?

Contact:

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