Report SNAFU - Abenteuer Vielzeiler

„The three most dangerous things are a programmer with a soldering iron, a manager who codes, and a user who gets ideas.“

Florian Westphal - Hagen Paul Pfeifer

8. Juli 2005

Themenübersicht

1. /dev/fun
2. Error-Handling für Profis
3. Behandlung externe Eingaben
4. Race Conditions

Code Stereogramm

nach ca. 2 Minuten denkt man, man wäre auf psychoaktiven Drogen . . .

`tcp.c bei Solaris`

```
tcp->tcp_conn.tcp_eager_conn_ind = NULL;
ASSERT(listener->tcp_conn_req_cnt_q0 > 0);
listener->tcp_conn_req_cnt_q0--;
listener->tcp_conn_req_cnt_q++;
tcp->tcp_eager_next_q0->tcp_eager_prev_q0=
tcp->tcp_eager_prev_q0;
tcp->tcp_eager_prev_q0->tcp_eager_next_q0=
tcp->tcp_eager_next_q0;
tcp->tcp_eager_prev_q0 = NULL;
tcp->tcp_eager_next_q0 = NULL;
tcp->tcp_conn_def_q0 = B_FALSE;
```

Funktionen verstehen

```
fprintf(stderr, "Usage:     elfdump <file> <output data>\n");
fprintf(stderr, "\nValid options for <output data> are:\n");
fprintf(stderr, "  --basic       Displays just the ELF version, file "
    "type and target architecture\n");
fprintf(stderr, "  --depend      Displays Shared Object dependency"
    " information\n");
fprintf(stderr, "  --dynamic     Displays information regarding dynamic"
    " linking requirements\n");
fprintf(stderr, "  --dynsym      Displays information regarding dynamic"
    " linking symbols\n");
fprintf(stderr, "  --exports     Displays exported symbol information\n");
fprintf(stderr, "  --files       Displays file information for the"
    " binary\n");
fprintf(stderr, "  --funcrep     Displays information about functions"
    " in a column format\n");
fprintf(stderr, "  --got         Displays the values contained within the"
    " Global Offset Table\n");
fprintf(stderr, "  --interp      Displays the name of the executable"
    " that interprets this file\n");
fprintf(stderr, "  --reloc       Displays relocation information"
    " (no addends)\n");
fprintf(stderr, "  --secrep      Displays section information in a"
```

```
    " column format\n");
fprintf(stderr, "  --sections    Displays section information\n");
fprintf(stderr, "  --segments    Displays segment information\n");
fprintf(stderr, "  --segrep      Displays segment information in a"
    " column format\n");
fprintf(stderr, "  --symbols     Displays symbol information\n");
fprintf(stderr, "  --symrep      Displays symbol information in a"
    " column format\n");
fprintf(stderr, "\nNote that the following options only work for"
    " non-stripped binaries:\n");
fprintf(stderr, "  --symbols, --symrep, --exports, --funcrep, --files\n");
```

Verwenden sie sprechende Namen!

```
private void replaceAttributeRequiredInXMLTaskNodeWithAttributeRequiredInHTMLNode(
                      Node aTargetTaskNode, Node aSourceTaskNode) {
 [..]
}

[..]

private void replaceAttributeRequiredInAttributeNodeWithValueFoundInNodeVector(
                      Node aTargetAttributeNode, Vector aSourceAttributeVector) {
[..]
}
```

switch für Experten

```
int d1_tmap_num_unique(short d1_tmap_num) {
 switch (d1_tmap_num) {
  case   0: case   2: case   4: case   5: case   6: case   7: case   9:
  case  10: case  11: case  12: case  17: case  18:
  case  20: case  21: case  25: case  28:
  case  38: case  39: case  41: case  44: case  49:
  case  50: case  55: case  57: case  88:
  case 132: case 141: case 147:
  case 154: case 155: case 158: case 159:
  case 160: case 161: case 167: case 168: case 169:
  case 170: case 171: case 174: case 175: case 185:
  case 193: case 194: case 195: case 198: case 199:
  case 200: case 202: case 210: case 211:
  case 220: case 226: case 227: case 228: case 229: case 230:
  case 240: case 241: case 242: case 243: case 246:
  case 250: case 251: case 252: case 253: case 257: case 258: case 259:
  case 260: case 263: case 266: case 283: case 298:
  case 315: case 317: case 319: case 320: case 321:
  case 330: case 331: case 332: case 333: case 349:
  case 351: case 352: case 353: case 354:
  case 355: case 357: case 358: case 359:
  case 362: case 370: return 1;
  default: return 0;
 }
}
```

Hä?

```
if (d1_tmap_num >= 29 && d1_tmap_num <= 37)
      return d1_tmap_num - 16;
if (d1_tmap_num >= 58 && d1_tmap_num <= 87)
      return d1_tmap_num - 24;
if (d1_tmap_num >= 89 && d1_tmap_num <= 131)
      return d1_tmap_num - 25;
if (d1_tmap_num >= 133 && d1_tmap_num <= 140)
      return d1_tmap_num - 26;
if (d1_tmap_num >= 176 && d1_tmap_num <= 184)
      return d1_tmap_num + 33;
if (d1_tmap_num >= 186 && d1_tmap_num <= 192)
      return d1_tmap_num + 32;
if (d1_tmap_num >= 203 && d1_tmap_num <= 209)
      return d1_tmap_num + 25;
if (d1_tmap_num >= 212 && d1_tmap_num <= 219)
      return d1_tmap_num + 23;
if (d1_tmap_num >= 231 && d1_tmap_num <= 239)
      return d1_tmap_num + 18;
if (d1_tmap_num >= 267 && d1_tmap_num <= 281)
      return d1_tmap_num + 10;
if (d1_tmap_num >= 287 && d1_tmap_num <= 297)
      return d1_tmap_num + 13;
if (d1_tmap_num >= 299 && d1_tmap_num <= 314)
      return d1_tmap_num + 12;
```

Kreativer Umgang mit *$#! Hardware . . .

```
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t try to access
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t try to access
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t try to access
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t even give the
* IOC3 is fucked fucked beyond believe ...  Don’t try to access
```

Bye the way

```
$ egrep -rin ".*fuck.*" /usr/src/linux-2.6.12-rc6-mm1-kocotpus |wc -l
57
$ egrep -rn ".*FIXME.*" /usr/src/linux-2.6.12-rc6-mm1-kocotpus  | wc -
3097
```

Ratespiel

```
if ((in[0] == 0x00) && (in[1] == 0x00) &&
    (in[2] == 0x00) && (in[3] == 0x3C))
    return(XML_CHAR_ENCODING_UCS4BE);
if ((in[0] == 0x3C) && (in[1] == 0x00) &&
    (in[2] == 0x00) && (in[3] == 0x00))
    return(XML_CHAR_ENCODING_UCS4LE);
if ((in[0] == 0x00) && (in[1] == 0x00) &&
    (in[2] == 0x3C) && (in[3] == 0x00))
    return(XML_CHAR_ENCODING_UCS4_2143);
if ((in[0] == 0x00) && (in[1] == 0x3C) &&
    (in[2] == 0x00) && (in[3] == 0x00))
    return(XML_CHAR_ENCODING_UCS4_3412);
if ((in[0] == 0xFE) && (in[1] == 0xFF))
    return(XML_CHAR_ENCODING_UTF16BE);
if ((in[0] == 0xFF) && (in[1] == 0xFE))
    return(XML_CHAR_ENCODING_UTF16LE);
```

... oder doch massiv dokumentieren ...

libpcap-2005.06.18/pcap-linux.c

```
calc $(egrep -rn ".*[/*] .*" pcap-linux.c|wc -l) \
     / ($(<pcap-linux.c|wc -l)/100)
30.2903
```

... oder einfach nur unwartbar?!

```
#ifdef SUPPORT_PROXY
  static int add_proxy(const char* c) {
  struct cgi_proxy* x=malloc(sizeof(struct cgi_proxy));
  int i;
  if (!x) return -1;
  byte_zero(x,sizeof(struct cgi_proxy));
  i=scan_ip6if(c,x->ip,&x->scope_id);
  if (c[i]!='/') { nixgut: free(x); return -1; }
  c+=i+1;
  i=scan_ushort(c,&x->port);
  if (c[i]!='/') goto nixgut;
  c+=i+1;
  if (regcomp(&x->r,c,REG_EXTENDED|REG_NOSUB))
  goto nixgut;
  if (!last)
    cgis=last=x;
  else
```

```
    last->next=x; last=x;
  return 0;
}
```

Systemcalls liefern nie Fehler . . .

```
fd = socket (AF_UNIX, SOCK_STREAM, 0);
[..]
if (bind (fd, (struct sockaddr*) &cli_adr, length) < 0) {
  perror ("bind");
  exit (EXIT_FAILURE);
}
```

Pufferlängenberechnung

```
 p = (char *)fs_get((strlen(nick ? nick : "Alternate Role") +
                    strlen(comment ? comment : "") +
                    strlen(to_pat ? to_pat : "") +
                    strlen(from_pat ? from_pat : "") +
                    strlen(sender_pat ? sender_pat : "") +
                    strlen(cc_pat ? cc_pat : "") +
[.. 22 weitere solcher Zeilen entfernt .. ]
                    strlen(fcc_act ? fcc_act : "") +
                    strlen(litsig_act ? litsig_act : "") +
                    strlen(cstm_act ? cstm_act : "") +
                    strlen(smtp_act ? smtp_act : "") +
                    strlen(nntp_act ? nntp_act : "") +
                    strlen(sig_act ? sig_act : "") +
                    strlen(incol_act ? incol_act : "") +
                    strlen(sort_act ? sort_act : "") +
                    strlen(iform_act ? iform_act : "") +
                    strlen(start_act ? start_act : "") +
                    strlen(filt_ifnotdel ? filt_ifnotdel : "") +
                    strlen(filt_nokill ? filt_nokill : "") +
                    strlen(filt_nonterm ? filt_nonterm : "") +
                    (folder_act ? (strlen(folder_act) + 8) : 0) +
                    strlen(keyword_set ? keyword_set : "") +
                    strlen(keyword_clr ? keyword_clr : "") +
                    strlen(templ_act ? templ_act : "") + 520)*sizeof(char));
```

?

```
/* convert to a number */
/* within the set [A-Za-z0-9-_] */
char*ultoan(val,dest)unsigned long val;char*dest;
{ register int i;
  do
   { i=val&0x3f;           /* collating sequence dependency! */
     *dest++=i+(i<26?'A':i<26+26?'a'-26:i<26+26+10?'0'-26-26:
      i==26+26+10?'-'-26-26-10:'_'-26-26-11);
   }
  while(val>>=6);
  *dest='\0';
  return dest;
}
```

goto-Fetischisten

```
closebrace:            if(!startb)
                  startb=(char*)empty;
               break;
          }
         goto ibreak;                              /* $$ =pid */
      case '$':ultstr(0,(unsigned long)thepid,startb=num);
         goto ieofstr;
      case '?':ltstr(0,(long)lexitcode,startb=num);
         goto ieofstr;
      case '#':ultstr(0,(unsigned long)crestarg,startb=num);
         goto ieofstr;
      case '=':ltstr(0,lastscore,startb=num);
ieofstr:          i='\0';
         goto copyit;
      case '_':startb=incnamed?incnamed->ename:(char*)empty;
         goto ibreak;
      case '-':startb=(char*)tgetenv(lastfolder);/* $- =$LASTFOLDER */
ibreak:           i='\0';
            break;
        default:
         { int quoted=0;
             if(numeric(i))     /* $n positional argument */
            { *startb++=i;i='\0';
             goto finsb;
```

ein paar asciiz über Sicherheitsprobleme

- Buffer Overflows (gets, scanf, strcpy, strcat, sprintf)
- system()
- getenv()
- Race Conditions
- . . . (beware of the the dogs)

Buffergroesse im Auge behalten!

```
quaqut.buffer_reply_size[QUAQUT_PLAYERINFO] = 0;
[..]
case 0x02:
 if ( quaqut.buffer_reply_size[QUAQUT_PLAYERINFO] + buffer_size
      <= 2047 )
 {
memcpy( &(quaqut.buffer_reply[QUAQUT_PLAYERINFO]
                              [quaqut.buffer_reply_size[QUAQUT_PLAYERIN
       , &buffer[5] , 2047 - quaqut.buffer_reply_size[QUAQUT_PLAYERINF
quaqut.buffer_reply_size[QUAQUT_PLAYERINFO] += (buffer_size - 5);
 }
break;
```

Buffer immer NULL terminieren!

```
int
crammd5(char *challengeb64, char *username,
           char *password, char *responseb64)
{       int i;
        unsigned char digest[MD5_DIGEST_LEN];
        unsigned char digascii[MD5_DIGEST_LEN * 2];
        unsigned char challenge[(BUF_SZ + 1)];
[..]
        for (i = 0; i < MD5_DIGEST_LEN; i++) {
                digascii[2 * i] = hextab[digest[i] >> 4];
                digascii[2 * i + 1] = hextab[(digest[i] & 0x0F)];
        }
        digascii[MD5_DIGEST_LEN * 2] = '\0';

[..]
```

Dumm gelaufen

```
int pclose(FILE *f) {
  int status;
  fclose(f);
  if (waitpid(f->popen_kludge,&status,0)>=0)
    return status;
  return -1;
}
```

Mirdochegal...

```
void segv_handler()
{
        int     saved_errno = errno;

        log(L_VB, "PANIC: segmentation violation!"
                        " sleeping for 30 seconds.");
        if (coredump() != 0)
                do_sleep(30);
        errno = saved_errno;
}
```

...Oder doch nicht?!

```
int coredump(void) {
        static int      dumped = 0;
        struct rlimit   rlim;

        if (dumped) return 1;
        dumped = 1;

        if (fork() != 0) return 1;

        rlim.rlim_cur = RLIM_INFINITY;
        rlim.rlim_max = RLIM_INFINITY;
        setrlimit(RLIMIT_CORE, &rlim);
        chdir("/");
        signal(SIGSEGV, SIG_DFL);
        raise(SIGSEGV);
        return 0;
}
```

„Das kommt doch nie vor...”

```
SuperClassRootGeometryManager (Widget gw, XtWidgetGeometry *request,
                               XtWidgetGeometry *reply) {
  ShellWidgetClass swc = (ShellWidgetClass) SUPERCLASS_WIDGET_CLASS;
[..]
  GenericClassExtRec *gcer;
[..]
  for (gcer = (GenericClassExtRec *) swc->shell_class.extension;
       gcer;
       gcer = (GenericClassExtRec *) gcer->next_extension)
    {
      if (gcer->record_type == NULLQUARK)
        break;
    }
[..]
  if (!gcer)
    abort ();
}
```

Sorgfältiges Arbeiten

```
librpcsvc/xcrypt.c, FreeBSD 5.3
int xencrypt(secret, passwd)
        char *secret;
        char *passwd;
{
[..]
        char *buf;
[..]
        int len;

        len = strlen(secret) / 2;
        buf = malloc((unsigned)len);

        hex2bin(len, secret, buf);
        err = cbc_crypt(key, buf, len, DES_ENCRYPT | DES_HW, ivec);
[..]
```

Extreme-Error-Checking

```
[..]
    else if(strcasecmp(p, "HostName") == 0) {
       if(strncpy(hostname, q, MAXHOSTNAMELEN) == NULL) {
                  die("parse_config() -- strncpy() failed");
       }
    }
```

Return-Werte abprüfen

```
char *fd_gets(char *buf, int size, int fd) {
        int i = 0; char c;

        while((i < size) && (read(fd, &c, 1) == 1)) {
                if(c == '\r');  /* Strip <CR> */
                else if(c == '\n') {
                        break;
                } else
                        buf[i++] = c;
        }
        buf[i] = (char)NULL;
        return(buf);
}

int smtp_read(int fd, char *response) {
        do {
                if(fd_gets(response, BUF_SZ, fd) == NULL)
                        return(0);
        }
        while(response[3] == '-');

        return(atoi(response) / 100);
}
```

Professionelle Fehlerbehandlung

plugins/org.eclipse.compare/compare/org/eclipse/compare/internal/CompareUIPlugin.java

```
try {
   fgImages2.put(id, image);
} catch (NullPointerException ex) {
      // NeedWork
}
```

Fachgerechte Input Validations

```
http://www.fh-furtwangen.de/search/index.html?qu=%3C
script%3Ealert%28%27world+domination%27%29%3C%2F
script%3E&i=10&tg=0&lng=de&cf=%2Fdeutsch%2F&x=0&y=0
```

SSL-Keys sicher Erstellen

```
cp /dev/null $pemfile
chmod 600 $pemfile
chown root $pemfile

/usr/bin/openssl req -new -x509 -days ${days} -nodes \
        -config ${conffile} -out $pemfile -keyout $pemfile \
        -rand /dev/urandom || cleanup
```

Beschwerde

```
/* Oh boy, this interface sucks so badly, there are no
 * words for it.
 * Not one, not two, but _three_ error signalling methods!
 * (*h_errnop nonzero?  return value nonzero?  *RESULT zero?)
 *  The glibc goons really outdid themselves with this one. */

int gethostbyaddr_r(const char* addr, size_t length, int format,
                    struct hostent* result, char *buf, size_t buflen,
                    struct hostent **RESULT, int *h_errnop) {
```

Hä?

```
/* nobody can figure this part of the code anymore.. -kalt
       if (chasing && ischop)
             sendto_one(cptr, ":%s MODE %s %c%c %s",
                        ME, chptr->chname,
                        whatt == MODE_ADD ? '+' : '-',
                       *curr, who->name);
*/
```

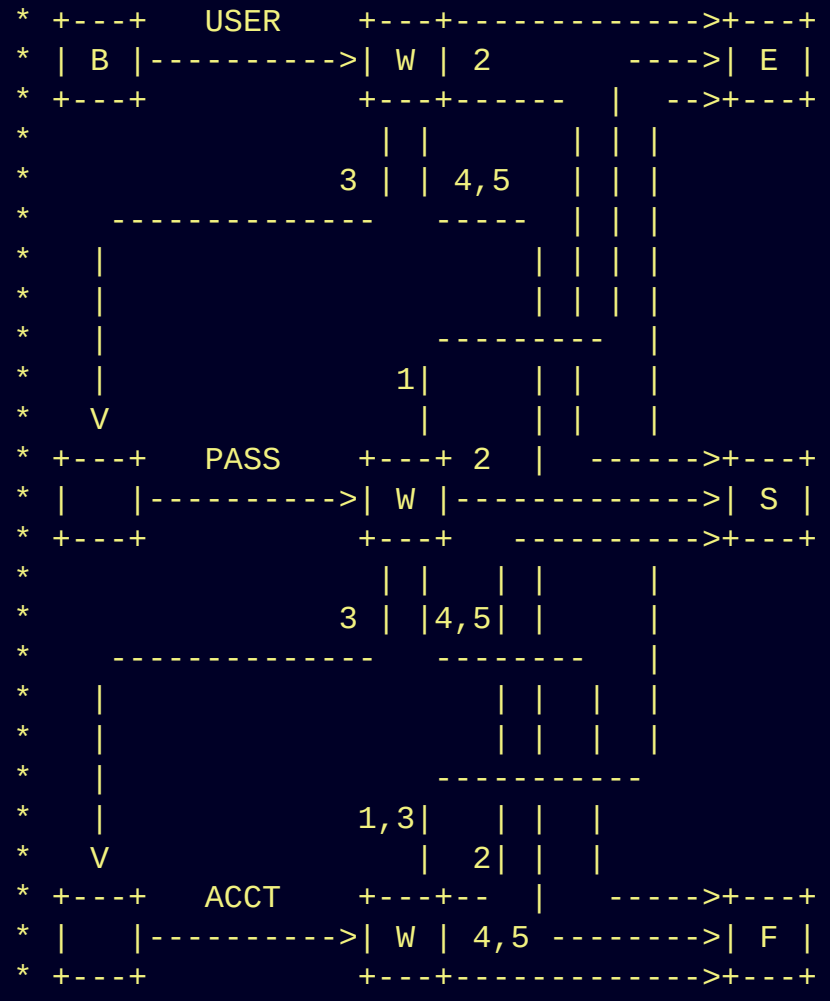
SCHULDIG!

```
/*
 * My personal strstr() implementation that beats most
 * other algorithms. Until someone tells me otherwise,
 * I assume that this is the fastest implementation of
 * strstr() in C. I deliberately chose not to comment it.
 * You should have at least as much fun trying to
 * understand it, as I had to write it :-).
 */
```

Finger Weg!

```
/*
 * This comment is in hope to prevent silly people from
 * e.g. SuSE (who did not yet learn C but believe that
 * they need to patch other peoples code) from changing the
 * next cast into an illegal lhs cast expression.
 * The cast below is the correct way to handle the problem.
 * The (void *) cast is to avoid a GCC warning like:
 * "warning: dereferencing type-punned pointer will break \
 * strict-aliasing rules"
 * which is wrong this code. (void *) introduces a compatible
 * intermediate type in the cast list.
 */
 count -= got, *(char **)(void *)&buffer += size * got;
```

Alles Klar?



Daten einlesen

```
   char puffer[255],kommando[25500];
[..]
   do
   {
[..]
         len = read(socket_to_peer, puffer , sizeof(puffer));
         printf("Read from socket rets: %d\n",len);
[..]
      if (len < 0)
      {
         perror("read error from socket");
      }
      if (len > 0)
      {
         puffer[len]= 0;
[..]
         strcat(kommando,puffer);
[..]
      }
      endOfCommandReceived= !strcmp(kommando+strlen(kommando)-4,"\r\n\r\n");
    } while ( len > 0 && !endOfCommandReceived);
```

Ooops

```
$ perl -e "print ’a’ x 513" > egal
$ mpg123 --list egal
High Performance MPEG 1.0/2.0/2.5 Audio Player for Layer 1, 2 and 3.
Version 0.59s-r9 (2000/Oct/27). Written and copyrights by Michael Hipp
Uses code from various people. See ’README’ for more!
THIS SOFTWARE COMES WITH ABSOLUTELY NO WARRANTY! USE AT YOUR OWN RISK!
mpg123: stack smashing attack in function new_playlist()
zsh: abort (core dumped)  mpg123 --list egal
```

Der Kot

```
if (fgets(line, 1023, playlist->listfile)) {
    i = strcspn(line, "\t\n\r");
    /*                line[i] = '\0'; */
    /* kill useless spaces at the end of the string*/
    {
          char *c_line = &line[i-1];
          while (i--){
              if (*c_line == ' ')
                    c_line--;
              else
                    *(++c_line) = '\0';
          }
    }
```