

Data Flow Testing

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based on material from chapter 13 of “Software Testing and Analysis” by Pezze and Young.

Recall Our Previous Example

```

1
2 /* External file hex_values.h defines Hex_Values[]
3 * with value 0 to 15 for the legal hex digits (case-insensitive)
4 * and value -1 for each illegal digit (including special characters)
5 */
6
7 #include "hex_values.h"
8
9 /* Translate a string from the C99 encoding to plain text.
10 * " " becomes space, '\ux' becomes byte with hex value ux,
11 * other unprintable characters map to themselves.
12 * Returns 0 for success, positive for erroneous input
13 */
14 int cgi_decode(char *encoded_char, char *decoded) {
15     char *cp = encoded;
16     while (*cp) {
17         int ch = *cp;
18         if (ch == ' ') { /* Case 1: " " maps to blank */
19             *cp = ' ';
20         } else if (ch == '\\') { /* Case 2: "\ux" is hex for character ux */
21             int digit_high = Hex_Values[ch+1]-48;
22             int digit_low = Hex_Values[ch+2]-48;
23             if (digit_high == -1 || digit_low == -1) {
24                 /* Bad hex code */
25                 return -1;
26             } else {
27                 *cp = 16*digit_high + digit_low;
28             }
29         } else { /* Case 3: All other characters map to themselves */
30             *cp = ch;
31         }
32         cp++;
33     }
34     return 0; /* Null terminator for string */
35 }

```

Figure 12.1: The C function `cgi_decode`, which translates a cgi-encoded string to a plain ASCII string (reversing the encoding applied by the common gateway interface of most Web servers). This program is also used in Chapter 12 and also presented in Figure 12.1 of Chapter 12.

- Definitions are places where variables are given values, e.g. “ok” on line 17.
- Uses are places where the value of a variable is used, e.g. “ok” on line 40.
- DU Pairs match definition, uses.
- DU Paths connect DU Pairs.

DU Coverage Criteria

- $C_{DU\ Pairs} = \frac{\#\ DU\ Pairs\ exercised}{\#\ DU\ Pairs}$
- $C_{DU\ Paths} = \frac{\#\ DU\ Paths\ exercised}{\#\ DU\ Paths}$
- $C_{definitions} = \frac{\#\ Definitions\ exercised}{\#\ Definitions}$

How Many Are There ?

1. void strcpy(char *source, char *dest) {	4D
2. while (*source)	2U
3. *dest++ = *source++;	4D, 3U
4. *dest = '\0'	1D, 1U
5. return;	0
6. }	