

**1. Intro.** This program makes DLX data to find all ways to attack or occupy all cells of an  $n \times n$  board with  $m$  queens.

```
#define maxn 16      /* hexadecimal limitation */
#include <stdio.h>
#include <stdlib.h>
int m,n;             /* command-line parameters */
main(int argc, char *argv[])
{
    register int i,j,k;
    ⟨Process the command line 2⟩;
    ⟨Print the item-name line 3⟩;
    for (i = 0; i < n; i++)
        for (j = 0; j < n; j++) ⟨Print the option for a queen at position (i,j) 4⟩;
}
```

**2.** ⟨Process the command line 2⟩  $\equiv$

```
if (argc  $\neq$  3  $\vee$  sscanf(argv[1], "%d", &n)  $\neq$  1  $\vee$  sscanf(argv[2], "%d", &m)  $\neq$  1) {
    fprintf(stderr, "Usage: %s %d %d\n", argv[0]);
    exit(-1);
}
if (n > maxn) {
    fprintf(stderr, "Sorry, I don't presently allow %d!\n", maxn);
    exit(-2);
}
printf(" | %s %d %d\n", argv[0], n, m);
```

This code is used in section 1.

**3.** ⟨Print the item-name line 3⟩  $\equiv$

```
for (i = 0; i < n; i++)
    for (j = 0; j < n; j++) printf("1:%d|%x%x", m, i, j);
printf("%d|Q\n", m);
```

This code is used in section 1.

**4.** ⟨Print the option for a queen at position  $(i, j)$  4⟩  $\equiv$

```
{
    printf("Q_%x%x", i, j);
    for (k = 0; k < n; k++)
        if (k  $\neq$  i) printf("_%x%x", k, j);
    for (k = 0; k < n; k++)
        if (k  $\neq$  j) printf("_%x%x", i, k);
    for (k = 1; i + k < n  $\wedge$  j + k < n; k++) printf("_%x%x", i + k, j + k);
    for (k = 1; i - k  $\geq$  0  $\wedge$  j - k  $\geq$  0; k++) printf("_%x%x", i - k, j - k);
    for (k = 1; i + k < n  $\wedge$  j - k  $\geq$  0; k++) printf("_%x%x", i + k, j - k);
    for (k = 1; i - k  $\geq$  0  $\wedge$  j + k < n; k++) printf("_%x%x", i - k, j + k);
    printf("\n");
}
```

This code is used in section 1.

**5. Index.***argc*: [1](#), [2](#).*argv*: [1](#), [2](#).*exit*: [2](#).*fprintf*: [2](#).*i*: [1](#).*j*: [1](#).*k*: [1](#).*m*: [1](#).*main*: [1](#).*maxn*: [1](#), [2](#).*n*: [1](#).*printf*: [2](#), [3](#), [4](#).*sscanf*: [2](#).*stderr*: [2](#).

- ⟨ Print the item-name line 3 ⟩ Used in section 1.
- ⟨ Print the option for a queen at position  $(i, j)$  4 ⟩ Used in section 1.
- ⟨ Process the command line 2 ⟩ Used in section 1.

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