

March 15, 2012 at 09:58

**1. Data for dancing.** This program creates data suitable for the DANCE routine, solving the famous “*n* queens problem.” The value of *n* is a command-line parameter.

```
#include <stdio.h>
  <Global variables 3>
  <Subroutines 5>;
main(argc, argv)
  int argc;
  char *argv[];
{
  register int j, k, n, nn, t;
  <Read the command line 2>;
  <Output the column names 4>;
  <Output the possible queen moves 6>;
}
```

**2.** <Read the command line 2> ≡

```
if (argc ≠ 2 ∨ sscanf(argv[1], "%d", &param) ≠ 1) {
  fprintf(stderr, "Usage: %s\n", argv[0]);
  exit(-1);
}
n = param;
nn = n + n - 2;
```

This code is used in section 1.

**3.** <Global variables 3> ≡

```
int param;
```

This code is used in section 1.

**4.** We process the cells of the board in “organ pipe order,” on the assumption that—all other things being equal—a move near the center yields more constraints on the subsequent search.

```
<Output the column names 4> ≡
for (j = 0; j < n; j++) {
  t = (j & 1 ? n - 1 - j : n + j) >> 1;
  printf("r%c%c", encode(t), encode(t));
}
printf("|");
for (j = 1; j < nn; j++) printf(" a%c b%c", encode(j), encode(j));
printf("\n");
```

This code is used in section 1.

**5.** <Subroutines 5> ≡

```
char encode(x)
  int x;
{
  if (x < 10) return '0' + x;
  return 'a' - 10 + x;
}
```

This code is used in section 1.

6. ⟨Output the possible queen moves 6⟩ ≡  
**for** ( $j = 0; j < n; j++$ )  
  **for** ( $k = 0; k < n; k++$ ) {  
    *printf*("r%c\_c%c", *encode*( $j$ ), *encode*( $k$ ));  
     $t = j + k$ ;  
    **if** ( $t \wedge (t < nn)$ ) *printf*("\_a%c", *encode*( $t$ ));  
     $t = n - 1 - j + k$ ;  
    **if** ( $t \wedge (t < nn)$ ) *printf*("\_b%c", *encode*( $t$ ));  
    *printf*("\\n");  
  }

This code is used in section 1.

**7. Index.**

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*argv*: [1](#), [2](#).  
*encode*: [4](#), [5](#), [6](#).  
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*fprintf*: [2](#).  
*j*: [1](#).  
*k*: [1](#).  
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- ⟨Global variables 3⟩ Used in section 1.
- ⟨Output the column names 4⟩ Used in section 1.
- ⟨Output the possible queen moves 6⟩ Used in section 1.
- ⟨Read the command line 2⟩ Used in section 1.
- ⟨Subroutines 5⟩ Used in section 1.

# QUEENS

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