May 4, 2023 at 21:40

1. Copyright MetaverseX. May 4, 2023. Introduction. This program creates combinations of T traits, each of which have V variants. We have directories 1,2,3...T. Each directory has files 1,2,...V. We combine the files from the ith directory in each possible combination. This creates all combinations of files 1,1...1 (T times) 1,1...2 1,1...3 1,1...V ... V,V,...V.

⟨ Include. 2 ⟩
⟨ Definitions. 3 ⟩
⟨ Global variables. 4 ⟩
⟨ Main program. 5 ⟩

2. Including the required header files.

⟨ Include. 2 ⟩ ≡
```
#include <stdio.h>     /* printf */
#include <stdlib.h>     /* exit */
```
This code is used in section 1.

3. Defining the number of traits and the number of variants in each trait.

⟨ Definitions. 3 ⟩ ≡
```
#define T 7
#define V 4
```
This code is used in section 1.

4. Defining the variables that keep count of the variant to be used in each trait.

⟨ Global variables. 4 ⟩ ≡
```
int a[T + 1];
```
This code is used in section 1.

5. The entry point of the program.

⟨ Main program. 5 ⟩ ≡
```
int main( )
{
  ⟨ Initialize. 9 ⟩;
ended: ⟨ Ended? 10 ⟩;
combine: ⟨ Combine. 11 ⟩;
  i = T;
next: ⟨ Next 6 ⟩;
}
```
This code is used in section 1.

6. ⟨ Next 6 ⟩ ≡
```
if (a[i] < V) {
  ⟨ Increment ai. 7 ⟩;
  ⟨ Reset aj. 8 ⟩;
  goto ended;
}
else {
  i--;
  goto next;
}
```
This code is used in section 5.

7. ⟨ Increment ai. 7 ⟩ ≡
```
a[i]++;
```
This code is used in section 6.

8. ⟨ Reset aj. 8 ⟩ ≡
```
for (int j = i + 1; j ≤ T; j++) a[j] = 1;
```
This code is used in section 6.

9. We initialize the variables that store the trait numbers to be combined.

⟨ Initialize. 9 ⟩ ≡
```
int i;
for (int k = 1; k ≤ T; k++) a[k] = 1;
```
This code is used in section 5.

10. We end when we reach i==0 which happens when all a[i]==V except a[0].

⟨ Ended? 10 ⟩ ≡
```
if (i ≡ 0) exit(0);
```
This code is used in section 5.

11. Combine traits a1,a2...aT into one.

⟨ Combine. 11 ⟩ ≡
```
for (int m = 1; m ≤ T; m++) printf("%d", a[m]);
printf("\n");
```
This code is used in section 5.

⟨ Combine. 11 ⟩ Used in section 5.
⟨ Definitions. 3 ⟩ Used in section 1.
⟨ Ended? 10 ⟩ Used in section 5.
⟨ Global variables. 4 ⟩ Used in section 1.
⟨ Include. 2 ⟩ Used in section 1.
⟨ Increment ai. 7 ⟩ Used in section 6.
⟨ Initialize. 9 ⟩ Used in section 5.
⟨ Main program. 5 ⟩ Used in section 1.
⟨ Next 6 ⟩ Used in section 5.
⟨ Reset aj. 8 ⟩ Used in section 6.

COMBINATIONS