Project 4

Problem 1- Pointers as array arguments and using pointers to process arrays

Suppose you are given an array of positive integers of length n. An array is called good if the elements of the arrays have the same parity (even or odd). For example, elements of array [1, 5, 7] have the same parity odd, elements of array [2, 3, 4] do not have the same parity.

Example input/output #1:

```
Enter the length of the array: 7
Enter the elements of the array: 3 5 1 4 9 8
11 Output: not good
```

Example input/output #2:

```
Enter the length of the array: 4
Enter the elements of the array: 2 16 8 4
Output: good, all elements are even
```

Example input/output #3:

```
Enter the length of the array: 3
Enter the elements of the array: 5 13 17
Output: good, all elements are odd
```

1. In the main function, ask the user to enter the length of the input array, declare the input array. Then ask the user to enter the elements of the array.

2. The program should include the following function. **Do not modify the function prototype.**

```
void find_parity(int *a, int n, int * all_even, int
`*all_odd);
```

`a` represents the input array with length `n`. The `all_even` and `all_odd` parameters point to variables in which the function will store whether all of the array elements are all even or all odd.

This function should use pointer arithmetic– not subscripting – to visit array elements. In other words, eliminate the loop index variables and all use of the [] operator in the function.

3. In the main function, call the `find_parity` function to find whether all of the array elements are all even or all odd, or neither.

4. The `main` function displays the result.

Problem 2 – Check the inventory

A certain computer factory has grown over the years, and it now must improve its production lines to meet the demand. The first problem that the managers identified is the lack of organization in their inventory. They cannot even compute how many computers they can build using the parts available in storage. Luckily, they know that there are at most **K** different part types and each part has a unique code from **1** to **K**. Also, they know they have **N** parts in storage through a list of part codes that was created during this reorganization. Knowing that a computer is composed of **K** distinct parts, one of each of the existing part types, can you write a program that computes how many computers can be assembled with the parts in storage?

1. The program takes the number of parts in storage (**N**), the number of part types (**K**) and a list of **N** part codes from **1** to **K**. It computes the number of computers that can be assembled with the existing parts.
2. Input validation: the program validates the number of parts in storage ($1 \leq N \leq 1000000$), the number of part types ($1 \leq K \leq 10000$), and the code c_i of the i-th part in storage ($1 \leq c_i \leq 1000$). If any of the input values are invalid, the program prints a message and exits.

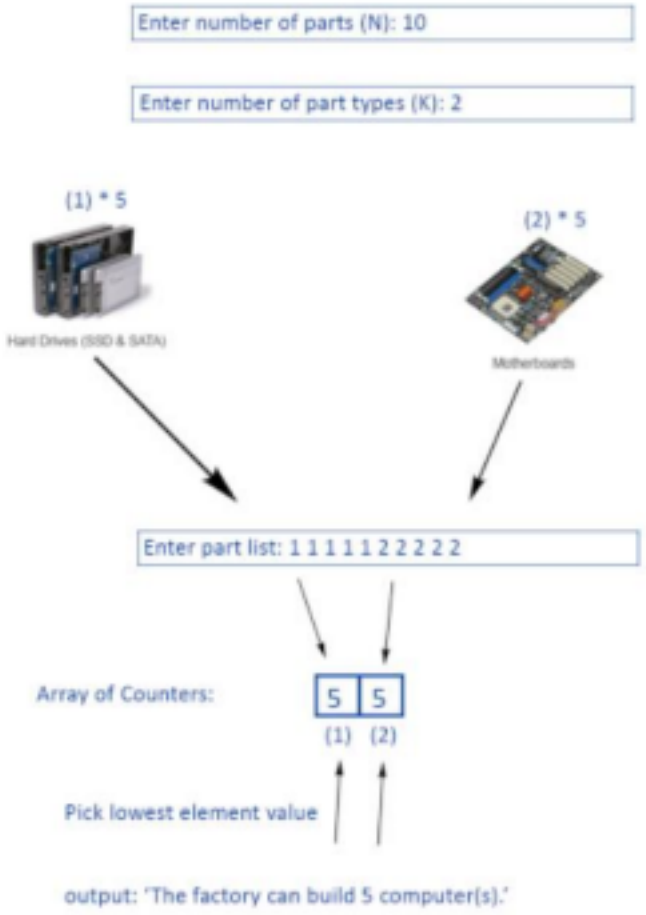
Hint: use the number of part types to create one array of counters. For example, in Example #1 below, the array of counters for the part list will be [5 5] since there are 5 of part type 1, and 5 of part type 2, therefore the factory can build 5 computers. In Example #2 below, the array of counters will be [4 4 4 6 2], therefore the factory can build 2 computers.

Example #1:

```
Enter number of parts (N): 10
```

```
Enter number of part types (K): 2
Enter part list:
1 1 1 1 1 2 2 2 2 2
The factory can build 5 computer(s).
```

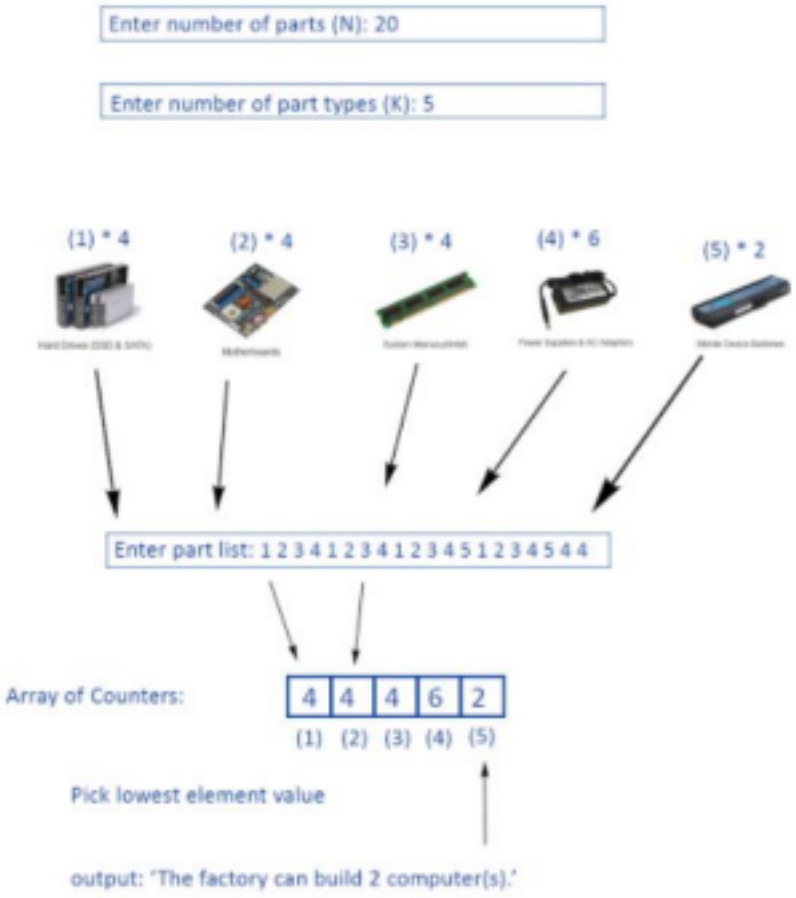
Illustration for Example #1:



Example #2:

```
Enter number of parts (N): 20
Enter number of part types (K): 5
Enter part list:
1 2 3 4 1 2 3 4 1 2 3 4 5 1 2 3 4 5 4 4
The factory can build 2 computer(s).
```

Illustration for Example #2:



1. In the main function, ask the user to enter number of parts, number of part types, and the part list.

2. The program should include the following function. **Do not modify the function prototype.**

```
int find_minimum(int *a, int n);
```

`a` represents the array of counters with length `n`. The function returns the minimum value of the array `a`.

This function should use pointer arithmetic– not subscripting – to visit array elements. In other words, eliminate the loop index variables and all use of the [] operator in the function.

3. In the main function, call the `find_minimum` function to find the minimum

value of the array of counters.

4. The `main` function displays the result.

1. Program name:
   project4_parity.c
   project4_inventory.c

2. Compile

   gcc -Wall project4_parity.c
   gcc –Wall projec4_inventory.c

3. Change Unix file permission on Unix:

   chmod 600 project4_parity.c
   chmod 600 project4_parity.c

4. Test your program with the shell script

   chmod +x try_project4_parity
   ./try_project4_parity

   chmod +x try_ project4_inventory
   ./try_ project4_inventory