**CPP Problem Design Example**

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| **Subject:** **CPU bit growth** |
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| **Main testing concept:** 較大數字運算   |  |  | | --- | --- | | **Basics** | **Functions** | | ■ C++ BASICS  ■ FLOW OF CONTROL  □ FUNCTION BASICS  □ PARAMETERS AND OVERLOADING  □ ARRAYS  □ STRUCTURES AND CLASSES  □ CONSTRUCTORS AND OTHER TOOLS  □ OPERATOR OVERLOADING, FRIENDS,AND REFERENCES  □ STRINGS  □ POINTERS AND DYNAMIC ARRAYS | □ SEPARATE COMPILATION AND NAMESPACES  □ STREAMS AND FILE I/O  □ RECURSION  □ INHERITANCE  □ POLYMORPHISM AND VIRTUAL FUNCTIONS  □ TEMPLATES  □ LINKED DATA STRUCTURES  □ EXCEPTION HANDLING  □ STANDARD TEMPLATE LIBRARY  □ PATTERNS AND UML | |
| **Description:**  Assume that the maximum integer of a **k**-bit CPU can process is (2^**k**) – 1. Every 10 years, **k** will grow by a multiple of 2. Assume that your company released a 4-bit CPU in 1900, which can store 15 as the largest integer. (8-bit will be released in 1910, and 1920 will be 16-bit, and so on.)    There is a given year **Y**, find the maximum positive integer **N** where **N!** is within the CPU calculation range of the current year.  Test time limit: 5.0 seconds  **Input:**  ﻿ Each line has a positive integer **Y** ( 2200 >= **Y** >= 1900 ).  The input method is unlimited input until EOF is read.  **Output:**  Output N, so that N! is within the CPU calculation range of the current year.  **Sample Input / Output：**   |  |  | | --- | --- | | Sample Input | Sample Output | | 1900 | 3 | | 1910 | 5 120 | | 2097 | 134480 | |
| **□ Eazy,Only basic programming syntax and structure are required.**  **■ Medium,Multiple programming grammars and structures are required.**  **□ Hard,Need to use multiple program structures or complex data types.** |
| **Expected solving time:**  25 minutes |
| **Other notes:** |