ICPC Sessions OR How to Solve Problems

Sebastian Claici sebastianclaici@gmail.com

December 5, 2012

Here's what you can use in the ACM ICPC:

- C
- C++
- Java
- Pascal

Here's what you can use in the ACM ICPC:

- C
- C++
- Java
- Pascal

Some useful tools:

• C++

- C++
 - The GNU toolchain GCC and GDB

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.
 - For Windows: Code::Blocks, FAR Manager, Visual Studio

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.
 - For Windows: Code::Blocks, FAR Manager, Visual Studio
- Java

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.
 - For Windows: Code::Blocks, FAR Manager, Visual Studio
- Java
 - Eclipse

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.
 - For Windows: Code::Blocks, FAR Manager, Visual Studio
- Java
 - Eclipse
 - IntelliJ IDEA

- C++
 - The GNU toolchain GCC and GDB
 - Your favourite text editor (*cough* Vim *cough*) by heart.
 - For Windows: Code::Blocks, FAR Manager, Visual Studio
- Java
 - Eclipse
 - IntelliJ IDEA
 - NetBeans

Complete Search

• Keep it simple.

- Keep it simple.
- Every problem can be solved through complete search.

- Keep it simple.
- Every problem can be solved through complete search.
- The trick is to recognise those that would work in time.

- Keep it simple.
- Every problem can be solved through complete search.
- The trick is to recognise those that would work in time.
- A complete search algorithm should be the first one you think about.

- Keep it simple.
- Every problem can be solved through complete search.
- The trick is to recognise those that would work in time.
- A complete search algorithm should be the first one you think about.
- A good rule of thumb:

- Keep it simple.
- Every problem can be solved through complete search.
- The trick is to recognise those that would work in time.
- A complete search algorithm should be the first one you think about.
- A good rule of thumb:

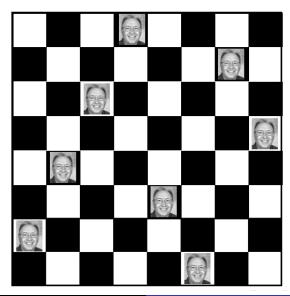
If it's less than 100 million operations, it will work in time.

Example

In how many ways can you place 8 queens on a chessboard so that they do not attack each other?

Example

Here's one way:



We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

• 8 places on each row, with 8 rows for a total of 8⁸ possibilities.

We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow ($8^8 = 16777216$)

We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow ($8^8 = 16777216$)

We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow $(8^8 = 16777216)$

We can do better



We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow ($8^8 = 16777216$)

We can do better - check if the current configuration isn't valid.



We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow $(8^8 = 16777216)$

We can do better - check if the current configuration isn't valid.

 At every point we have at most one queen placed on every row and column.

We could go over all possible ways to place the 8 queens, and check at the end whether it's valid.

- 8 places on each row, with 8 rows for a total of 8⁸ possibilities.
- Would work, but it's too slow $(8^8 = 16777216)$

We can do better - check if the current configuration isn't valid.

- At every point we have at most one queen placed on every row and column.
- Reduces the search space to 8! = 40320.

