The decltype Keyword Solutions

decltype

- Describe the decltype keyword
  - decltype is used only at compile time
  - Its argument must be either an object or an expression
  - If its argument is a named variable, the compiler will replace it with the declared type of the variable
  - Otherwise, the compiler will replace it with the type that the expression would return
  - The compiler does not evaluate the argument of decltype

decltype vs auto

- What are the main differences between the auto keyword and decltype?
  - auto is used to declare a variable which has the same type as its initializer
  - decltype is used to find the type of an existing variable or an expression
  - auto discards qualifiers such as const and reference
  - decltype keeps the qualifiers
- Write a simple program to illustrate your answer

decltype with lvalues and rvalues

- What is the result of decltype when the argument is
- A named variable
  - The declared type of the variable
- An expression which returns an lvalue
  - An lvalue reference to the returned type
- A prvalue
  - The deduced type of the argument
- An xvalue
  - An rvalue reference to the deduced type of the argument

decltype(auto)

- What happens if the argument to decltype is "auto"?
  - The type will be deduced the same way as with "auto"
  - However, the qualifiers will be retained
- Write a simple program to illustrate your answer

Applications of decltype

- Give two applications of decltype
  - Compile-time programming
  - Generic lambdas
- Write a simple program to illustrate your answer