# Bigstream C++ Challenge Problem

Design a template class that compute the murmur3 value of multiple keys together. Note that here we were asking for multi-value-key hashing and not hashing for multiple keys. For example if your multikeys are of types (int, string, double). Then examples of keys here can be (0, “hello”, 1.0) or (1, “abc”, 4.56), etc.

The number of keys and the type of the keys shall be templatized, which in C++11 means variadic template.

Provide an apply() member function of the class which takes a lambda function that returns a tuple of the key values that the class will use to get the murmur3 hashing.

Lambda makes it flexible to provide different key values. (Hint: the type of the return tuple of the lambda should be compatible to the type list of the murmur3 hashing class).

The template class will put all the key values in a byte array, and feed the array and its length to the standard murmur3 algorithm to get the hashing result.

You will need to implement parameter unpacking to extract the value from the tuple, copy them to the array, get the length of the array.

The class should support any simple types for keys, such as int, long, double, std::string, char\*, etc.

To solve this problem, you will very like need to use C++11 features, such as variadic templates, lambda functions, tuples, variadic parameter unpacking, etc.

Here are some resources that may be helpful to solve this question:

Murmur3 algorithm: [https://en.wikipedia.org/wiki/MurmurHash](https://en.wikipedia.org/wiki/MurmurHash" \t "_blank)

Variadic template:

[http://www.cplusplus.com/articles/EhvU7k9E/](http://www.cplusplus.com/articles/EhvU7k9E/" \t "_blank)

[http://eli.thegreenplace.net/2014/variadic-templates-in-c/](http://eli.thegreenplace.net/2014/variadic-templates-in-c/" \t "_blank)

[http://en.cppreference.com/w/cpp/language/parameter\_pack](http://en.cppreference.com/w/cpp/language/parameter_pack" \t "_blank)

[https://www.murrayc.com/permalink/2015/12/05/modern-c-variadic-template-parameters-and-tuples/](https://www.murrayc.com/permalink/2015/12/05/modern-c-variadic-template-parameters-and-tuples/" \t "_blank)

Lambda functions:

[http://en.cppreference.com/w/cpp/language/lambda](http://en.cppreference.com/w/cpp/language/lambda" \t "_blank)