Stitch Language Proposal

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Motivation

Most "modern" programming languages trace their origins back decades to before the advent of cheap, general purpose multicore CPUs. They were designed for a distinctly mono-threaded environment. While libraries and enhancements to mainstay languages such as C/C++ and Java have added multithreading capabilities, it remains in many ways bolted on kludge. While newer frameworks such as Node.js provide more integral support for asynchronous operations, they lack the depth of support and power of a fully compiled language. With Stitch, we aim to build a language that has the power and flexibility of a fully compiled C style language, while having native threading support for modern multi-threaded applications. Our goal is to create a translator from Stitch to C.

Description

Stitch is inspired by C, which has a very well known syntax, and has been one of the most widely used languages since it was released over forty years ago. Stitch is a general purpose language that supports all standard mathematical and logical operations. Like C, Stitch is strongly typed, and whitespace does not matter.

In addition to the standard C primitive types (`int, double, char`, etc.), Stitch has native support for the `string` type. This includes concatenation, and a inbuilt length operator. Stitch also has support for the `bool` type.

```
1 //Stitch comments are similar to C comments
2 //this is a single line comment
3 /*
4 You can also have multi-line comments
5 */
6
7 //functions are declared using the 'def' keyword, like Python
8 def int main() {
```

```
9
10    //the var keyword declares a variable
11    var int x = 7;
12    //booleans are a primitive data type
13    var bool b = true;
14
15    //strings are first class citizens in Stitch
16    var string s = "This is a String\n";
17    var string h = "Stitch also supports " + "string concatenation!";
18    var unsigned long l = lengthof(h);
19
20    let double PI = 3.14; //let is used to define constants
21
22    return 0;
23 }
```

What sets Stitch apart is its native support for multithreading using the `async` keyword. This keyword can be applied to any function call, as well as to any loop construct. When called in this way, functions and loops will run in their own thread.

```
1  /*
2  async keyword: used on function calls and on loop constructs, to
3  make the loop execute asynchronously
4  */
5
6  def int main() {
7
8    var int even_sum = 0;
9    var int odd_sum = 0;
10
11   //adds up all the even numbers from 0 to 100 million
12   async for(var int i = 0; i < 100000000; i+=2) {
13     even_sum += i;
14   }
15
16   //adds up all the odd numbers from 0 to 100 million
17   async for(var int i = 1; i < 100000000; i+=2) {
18     odd_sum += i;
19   }
20
21   printf("The sum of all values is %d", even_sum + odd_sum);
22
23   return 0;
24 }
```

Example Program

```
1  //functions are defined without the async keyword...
2  def int createHashTable(string[][] table) {
3
4    def int numItems = 0;
5
6    /*in here we'd put code to pull encrypted info from a file
7       and use it to create a hashtable for something like a server
8       */
9
10   return numItems;
11
12 }
13
14
15 def int main() {
16
17   var string[][] s;
18   var string user_name;
19   var string password;
20
21   //...but are called with the keyword when you want
22   //to run them in a separate thread
23
24   async createHashTable(s);
25
26   printf("Please enter your username: \n");
27   scanf("%s", user_name);
28
29   /*Since IO operations are slow and block, this async keyword
30   can be use to allow concurrent processing while waiting for
31   these user-dependent functions to finish
32   */
33
34 }
```