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VOWEL
string manipulation language
Overview

- High-level, imperative, statically-typed programming language intended to be used to iterate over, operate on, and manipulate large text inputs.

- Vowel aims to provide users handling large texts with a more intuitive syntax and complex functionality for manipulating strings.

- Mix of Python & C.
Architectural design

Source program *.vwl → Scanner → Parser → AST → Semant → C Libraries → Linking → Codegen → SAST → Binary executable
## Data types

<table>
<thead>
<tr>
<th>Primitive</th>
<th>Array</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Int</strong></td>
<td>Arithmetic operations</td>
</tr>
<tr>
<td><strong>Float</strong></td>
<td>Arithmetic operations</td>
</tr>
<tr>
<td><strong>Boolean</strong></td>
<td>Logical operations</td>
</tr>
<tr>
<td><strong>String</strong></td>
<td>String operations</td>
</tr>
<tr>
<td></td>
<td>Collection of primitive elements of the same type.</td>
</tr>
<tr>
<td></td>
<td>Support iteration, access by index, reassignment of values</td>
</tr>
</tbody>
</table>
Variable declarations

- In Vowel, variables must be both declared and assigned an initial value:

```java
int x = 4;
bool b = true;
string s = “test string”;
int[] arr = [1, 4, 10]
```

- Scope of variables are defined by curly braces, ‘{ }’
  - Global variables are those defined outside a method
  - Local variables are defined within the curly braces of a method
No main method

C

```c
int main() {
    printf("Hello World");
}
```

Vowel

```c
string hello() {
    printstr("Hello World");
}
```
Array

```
int[] arr = [1, 2, 3, 4];
string[] str_arr = ["first", "second", "third"];

int x = arr[2];
print(x); // Prints 3

str_arr[1] = "fourth";
prompt(str_arr[1]); // Prints fourth
```
## Strings

<table>
<thead>
<tr>
<th>String length</th>
<th>Increment</th>
</tr>
</thead>
</table>
| string name = “vowel”; | string name = “Bob”;
| int l = len(name);     | name += “ Smith”; // “Bob Smith” |
| // 5                   |                               |

<table>
<thead>
<tr>
<th>Slice</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>string name = “vowel is great!”;</td>
<td>string s1 = “My name is Vowel”;</td>
</tr>
</tbody>
</table>
| string new_l = slice(name, 8, 14); | String s2 = “My name is C”;
| // great                | String[] res = s1 - s2;
|                        | // [“Vowel”]                   |

<table>
<thead>
<tr>
<th>Concatenation</th>
<th>Intersection</th>
</tr>
</thead>
<tbody>
<tr>
<td>string name = “vowel is” + “great!”;</td>
<td>string s1 = “My name is Vowel”;</td>
</tr>
</tbody>
</table>
| // “vowel is great”    | String s2 = “My name is C”;
|                        | String[] res = s1 & s2;
|                        | // [“My”, “name”, “is”]       |

<table>
<thead>
<tr>
<th>Multiplication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>string name = “hello!” * 3;</td>
<td>string s1 = “My name is Vowel”;</td>
</tr>
</tbody>
</table>
| // “hello!hello!hello!”   | String s2 = “My name is C”;
|                         | String[] res = s1 & s2;
|                         | // [“My”, “name”, “is”]       |
Testing

**Test suite**

- Add tests to test all language functionality
- Run all tests at once with script
- Check Failed tests to find bugs

**Example Test File**

```cpp
#include <stdio.h>

int add(int x, int y) {
    return x + y;
}

int main() {
    printf("add(17, 25): %d\n", add(17, 25));
    return 0;
}
```
string getLongestSharedWord(string a, string b){
    string[] sharedWords = a & b;
    int longestWordLen = 0;
    string longestWord = "";
    int i = 0;
    for ( ; i<2; i=i+1){
        int currentlen = len(sharedWords[i]);
        if (currentlen > longestWordLen){
            longestWordLen = currentlen;
            longestWord = sharedWords[i];
        }
    }
    return longestWord;
}

string x = getLongestSharedWord("abra cadabra baba","babra cadabra baba");
printstr(x);

string order1 = "Your receipt contains: Jameson | Glenlivet | Seagrams | Fireball | Glenfiddich | Glenmorangie";
string order2 = "Your receipt contains: Glenmorangie | Oban | Glenlivet | Glenfiddich | Bowmore | Laphroaig";

string[] unique1 = order1 - order2;
int i = 0;
for ( ; i < 3 ; i=i+1 ){
    printstr(unique1[i]);
}
Future work

- Union operator

```csharp
string s = "Jameson, Glenlivet";
string s2 = "Seagrams, Jameson";
string[] union = s | s2;
// ["Jameson", "Glenlivet", "Seagrams"]
```

- Slicing with delimiters

```csharp
string s = "the firework will explode at 3:00PM";
string when = s["at ";0:]  // "3:00PM"
string vikWears = "gucci shirts gucci belts gucci tie";
string noCashLeft = vik["gucci ";2:] // "tie"
```