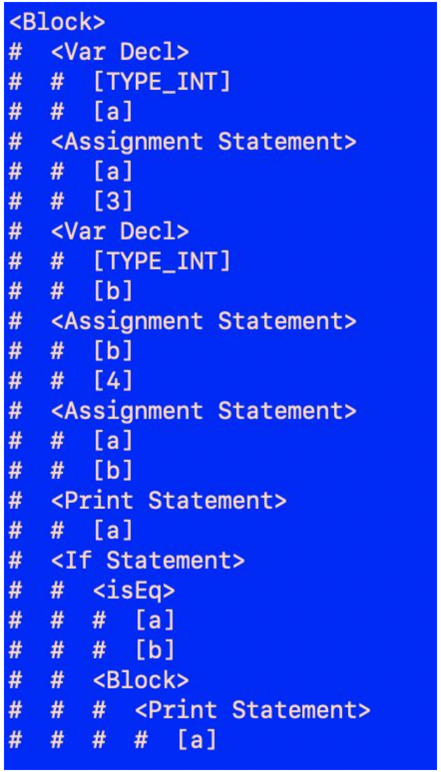
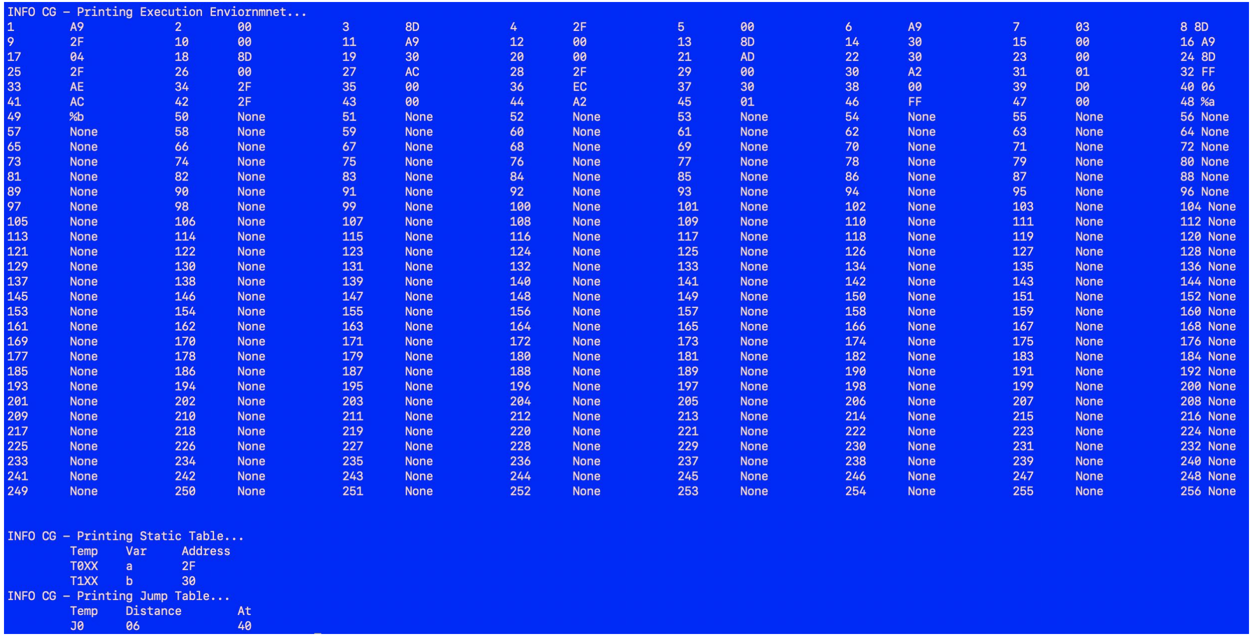
P4

Connor Gillis

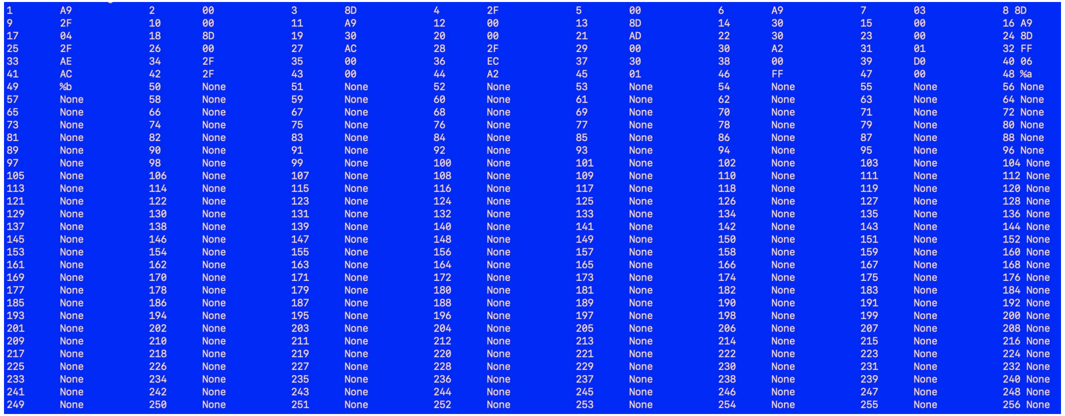


```
<Block>
#  <Var Decl>
#  #  [TYPE_INT]
#  #  [a]
#  <Assignment Statement>
#  #  [a]
#  #  [3]
#  <Var Decl>
#  #  [TYPE_INT]
#  #  [b]
#  <Assignment Statement>
#  #  [b]
#  #  [4]
#  <Assignment Statement>
#  #  [a]
#  #  [b]
#  <Print Statement>
#  #  [a]
#  <If Statement>
#  #  <isEq>
#  #  #  [a]
#  #  #  [b]
#  #  <Block>
#  #  #  <Print Statement>
#  #  #  #  [a]
```

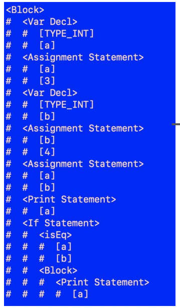


```
INFO CG - Printing Execution Enviornmnet...
1         A9              2         00              3         8D              4         2F              5         00              6         A9              7         03              8 8D
9         2F              10        00              11        A9              12        00              13        8D              14        30              15        00              16 A9
17        04              18        8D              19        30              20        00              21        AD              22        30              23        00              24 8D
25        2F              26        00              27        AC              28        2F              29        00              30        A2              31        01              32 FF
33        AE              34        2F              35        00              36        EC              37        30              38        00              39        D0              40 06
41        AC              42        2F              43        00              44        A2              45        01              46        FF              47        00              48 %a
49        %b              50        None            51        None            52        None            53        None            54        None            55        None            56 None
57        None            58        None            59        None            60        None            61        None            62        None            63        None            64 None
65        None            66        None            67        None            68        None            69        None            70        None            71        None            72 None
73        None            74        None            75        None            76        None            77        None            78        None            79        None            80 None
81        None            82        None            83        None            84        None            85        None            86        None            87        None            88 None
89        None            90        None            91        None            92        None            93        None            94        None            95        None            96 None
97        None            98        None            99        None            100       None            101       None            102       None            103       None            104 None
105       None            106       None            107       None            108       None            109       None            110       None            111       None            112 None
113       None            114       None            115       None            116       None            117       None            118       None            119       None            120 None
121       None            122       None            123       None            124       None            125       None            126       None            127       None            128 None
129       None            130       None            131       None            132       None            133       None            134       None            135       None            136 None
137       None            138       None            139       None            140       None            141       None            142       None            143       None            144 None
145       None            146       None            147       None            148       None            149       None            150       None            151       None            152 None
153       None            154       None            155       None            156       None            157       None            158       None            159       None            160 None
161       None            162       None            163       None            164       None            165       None            166       None            167       None            168 None
169       None            170       None            171       None            172       None            173       None            174       None            175       None            176 None
177       None            178       None            179       None            180       None            181       None            182       None            183       None            184 None
185       None            186       None            187       None            188       None            189       None            190       None            191       None            192 None
193       None            194       None            195       None            196       None            197       None            198       None            199       None            200 None
201       None            202       None            203       None            204       None            205       None            206       None            207       None            208 None
209       None            210       None            211       None            212       None            213       None            214       None            215       None            216 None
217       None            218       None            219       None            220       None            221       None            222       None            223       None            224 None
225       None            226       None            227       None            228       None            229       None            230       None            231       None            232 None
233       None            234       None            235       None            236       None            237       None            238       None            239       None            240 None
241       None            242       None            243       None            244       None            245       None            246       None            247       None            248 None
249       None            250       None            251       None            252       None            253       None            254       None            255       None            256 None


INFO CG - Printing Static Table...
          Temp    Var     Address
          T0XX    a       2F
          T1XX    b       30
INFO CG - Printing Jump Table...
          Temp    Distance        At
          J0      06              40
```

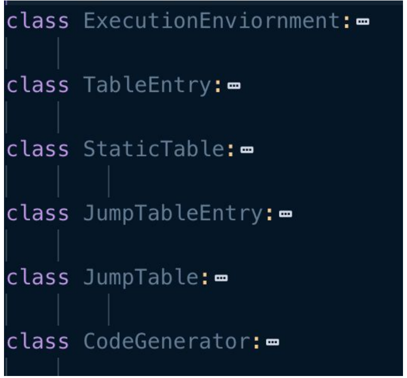
Data Structures



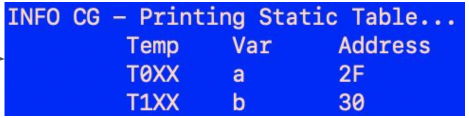
```
1    A9        2    00        3    8D        4    2F        5    00        6    A9        7    03        8 8D
9    2F        10   00        11   A9        12   00        13   8D        14   30        15   00        16 A9
17   04        18   8D        19   30        20   00        21   AD        22   30        23   00        24 8D
25   2F        26   00        27   AC        28   2F        29   00        30   A2        31   01        32 FF
33   AE        34   2F        35   00        36   EC        37   30        38   00        39   D0        40 06
41   AC        42   2F        43   00        44   A2        45   01        46   FF        47   00        48 %a
49   %b        50   None      51   None      52   None      53   None      54   None      55   None      56 None
57   None      58   None      59   None      60   None      61   None      62   None      63   None      64 None
65   None      66   None      67   None      68   None      69   None      70   None      71   None      72 None
73   None      74   None      75   None      76   None      77   None      78   None      79   None      80 None
81   None      82   None      83   None      84   None      85   None      86   None      87   None      88 None
89   None      90   None      91   None      92   None      93   None      94   None      95   None      96 None
97   None      98   None      99   None      100  None      101  None      102  None      103  None      104 None
105  None      106  None      107  None      108  None      109  None      110  None      111  None      112 None
113  None      114  None      115  None      116  None      117  None      118  None      119  None      120 None
121  None      122  None      123  None      124  None      125  None      126  None      127  None      128 None
129  None      130  None      131  None      132  None      133  None      134  None      135  None      136 None
137  None      138  None      139  None      140  None      141  None      142  None      143  None      144 None
145  None      146  None      147  None      148  None      149  None      150  None      151  None      152 None
153  None      154  None      155  None      156  None      157  None      158  None      159  None      160 None
161  None      162  None      163  None      164  None      165  None      166  None      167  None      168 None
169  None      170  None      171  None      172  None      173  None      174  None      175  None      176 None
177  None      178  None      179  None      180  None      181  None      182  None      183  None      184 None
185  None      186  None      187  None      188  None      189  None      190  None      191  None      192 None
193  None      194  None      195  None      196  None      197  None      198  None      199  None      200 None
201  None      202  None      203  None      204  None      205  None      206  None      207  None      208 None
209  None      210  None      211  None      212  None      213  None      214  None      215  None      216 None
217  None      218  None      219  None      220  None      221  None      222  None      223  None      224 None
225  None      226  None      227  None      228  None      229  None      230  None      231  None      232 None
233  None      234  None      235  None      236  None      237  None      238  None      239  None      240 None
241  None      242  None      243  None      244  None      245  None      246  None      247  None      248 None
249  None      250  None      251  None      252  None      253  None      254  None      255  None      256 None
```



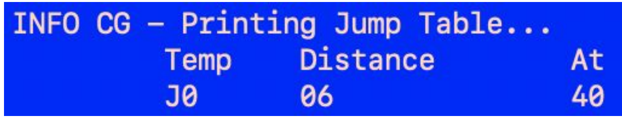
```
<Block>
#  <Var Decl>
#  #  [TYPE_INT]
#  #  [a]
#  <Assignment Statement>
#  #  [a]
#  #  [3]
#  <Var Decl>
#  #  [TYPE_INT]
#  #  [b]
#  <Assignment Statement>
#  #  [b]
#  #  [4]
#  <Assignment Statement>
#  #  [a]
#  #  [b]
#  <Print Statement>
#  #  [a]
#  <If Statement>
#  #  <isEq>
#  #  #  [a]
#  #  #  [b]
#  #  <Block>
#  #  #  <Print Statement>
#  #  #  #  [a]
```



```
class ExecutionEnviornment:⋯

class TableEntry:⋯

class StaticTable:⋯

class JumpTableEntry:⋯

class JumpTable:⋯

class CodeGenerator:⋯
```

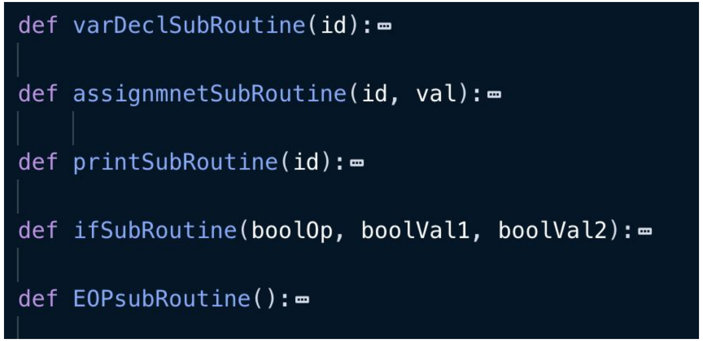


```
INFO CG - Printing Static Table...
          Temp     Var       Address
          T0XX     a         2F
          T1XX     b         30
```



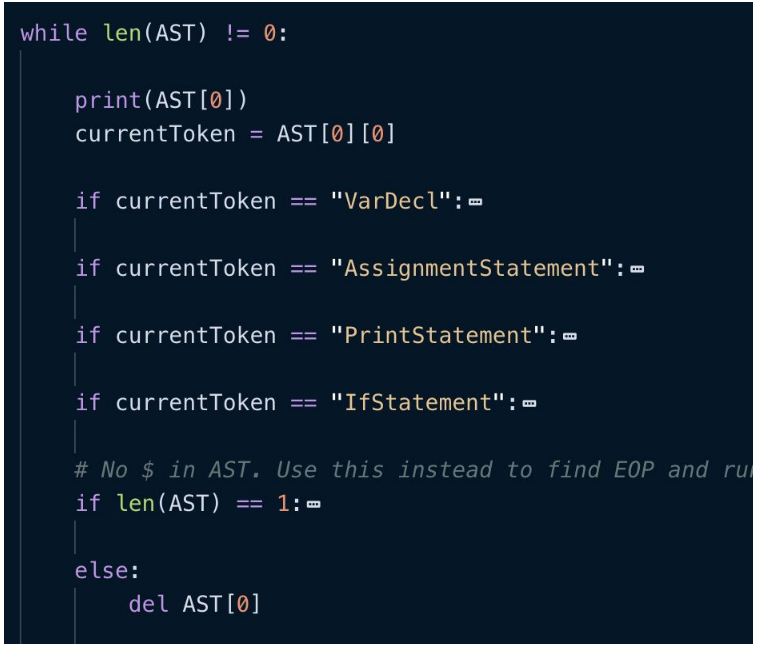
```
INFO CG - Printing Jump Table...
          Temp     Distance          At
          J0       06                40
```

CodeGenerator()



```
def varDeclSubRoutine(id):⋯

def assignmnetSubRoutine(id, val):⋯

def printSubRoutine(id):⋯

def ifSubRoutine(boolOp, boolVal1, boolVal2):⋯

def EOPsubRoutine():⋯
```

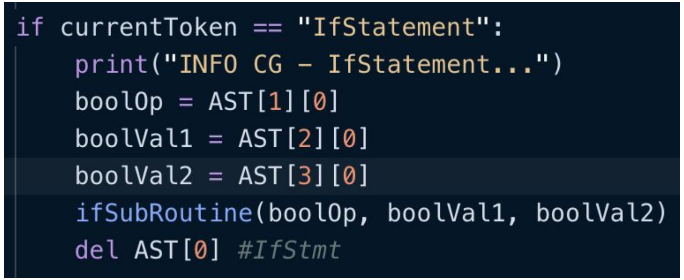
SubRoutines For Expected AST Nodes



```
while len(AST) != 0:

    print(AST[0])
    currentToken = AST[0][0]

    if currentToken == "VarDecl":⋯

    if currentToken == "AssignmentStatement":⋯

    if currentToken == "PrintStatement":⋯

    if currentToken == "IfStatement":⋯

    # No $ in AST. Use this instead to find EOP and ru
    if len(AST) == 1:⋯

    else:
        del AST[0]
```

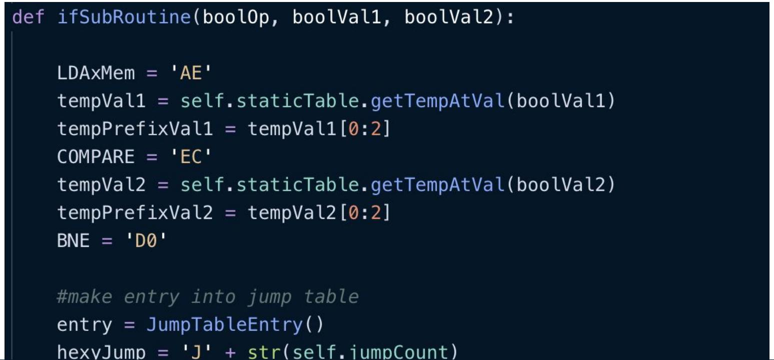
Run Through Nodes

i.e. IF

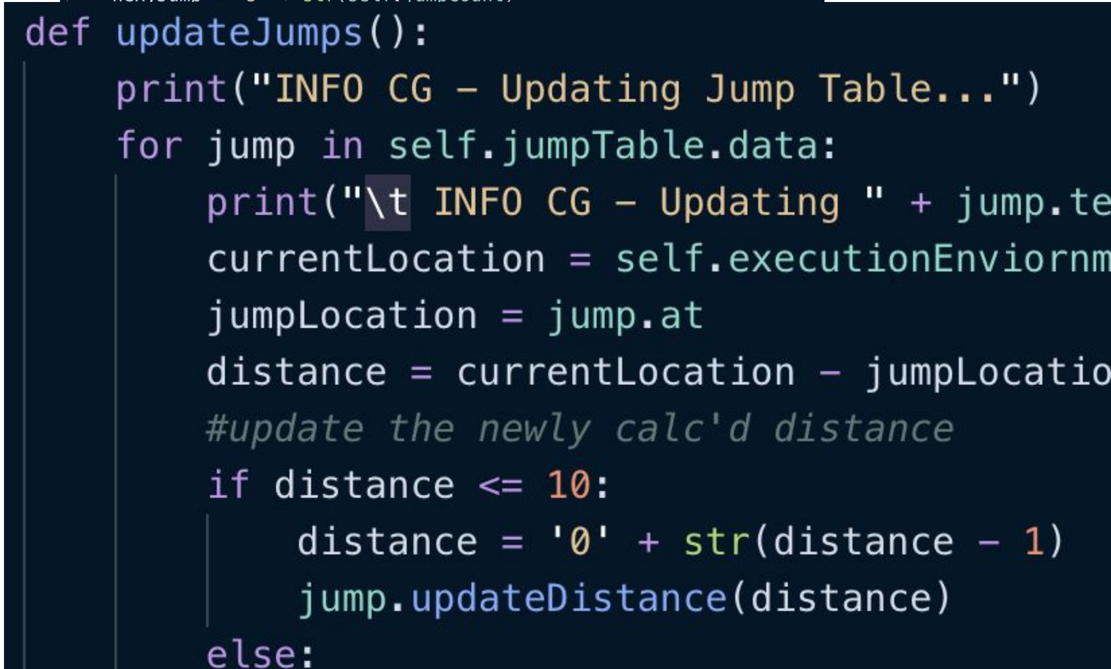


```
if currentToken == "IfStatement":
    print("INFO CG - IfStatement...")
    boolOp = AST[1][0]
    boolVal1 = AST[2][0]
    boolVal2 = AST[3][0]
    ifSubRoutine(boolOp, boolVal1, boolVal2)
    del AST[0] #IfStmt
```

Match node, get needed parameters, run subroutine

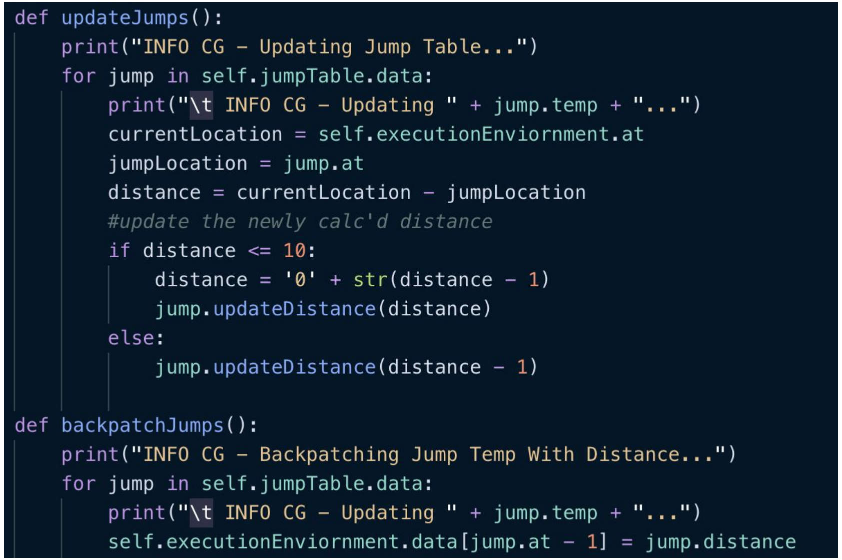


```
def ifSubRoutine(boolOp, boolVal1, boolVal2):

    LDAxMem = 'AE'
    tempVal1 = self.staticTable.getTempAtVal(boolVal1)
    tempPrefixVal1 = tempVal1[0:2]
    COMPARE = 'EC'
    tempVal2 = self.staticTable.getTempAtVal(boolVal2)
    tempPrefixVal2 = tempVal2[0:2]
    BNE = 'D0'

    #make entry into jump table
    entry = JumpTableEntry()
    hexyJump = 'J' + str(self.jumpCount)
```

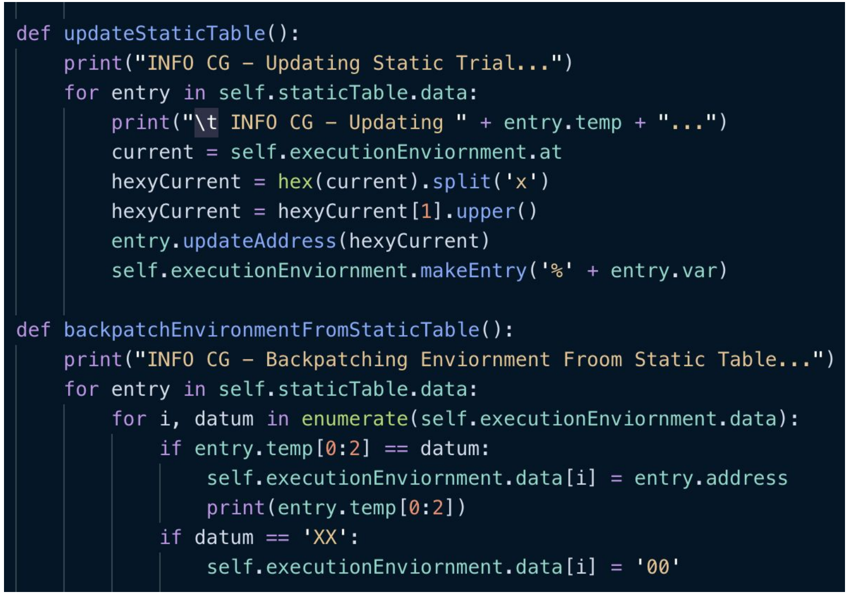


```
def updateJumps():
    print("INFO CG - Updating Jump Table...")
    for jump in self.jumpTable.data:
        print("\t INFO CG - Updating " + jump.te
        currentLocation = self.executionEnviornm
        jumpLocation = jump.at
        distance = currentLocation - jumpLocatio
        #update the newly calc'd distance
        if distance <= 10:
            distance = '0' + str(distance - 1)
            jump.updateDistance(distance)
        else:
```

i.e. IF



```
def updateJumps():
    print("INFO CG - Updating Jump Table...")
    for jump in self.jumpTable.data:
        print("\t INFO CG - Updating " + jump.temp + "...")
        currentLocation = self.executionEnviornment.at
        jumpLocation = jump.at
        distance = currentLocation - jumpLocation
        #update the newly calc'd distance
        if distance <= 10:
            distance = '0' + str(distance - 1)
            jump.updateDistance(distance)
        else:
            jump.updateDistance(distance - 1)

def backpatchJumps():
    print("INFO CG - Backpatching Jump Temp With Distance...")
    for jump in self.jumpTable.data:
        print("\t INFO CG - Updating " + jump.temp + "...")
        self.executionEnviornment.data[jump.at - 1] = jump.distance
```



```
def updateStaticTable():
    print("INFO CG - Updating Static Trial...")
    for entry in self.staticTable.data:
        print("\t INFO CG - Updating " + entry.temp + "...")
        current = self.executionEnviornment.at
        hexyCurrent = hex(current).split('x')
        hexyCurrent = hexyCurrent[1].upper()
        entry.updateAddress(hexyCurrent)
        self.executionEnviornment.makeEntry('%' + entry.var)

def backpatchEnvironmentFromStaticTable():
    print("INFO CG - Backpatching Enviornment Froom Static Table...")
    for entry in self.staticTable.data:
        for i, datum in enumerate(self.executionEnviornment.data):
            if entry.temp[0:2] == datum:
                self.executionEnviornment.data[i] = entry.address
                print(entry.temp[0:2])
            if datum == 'XX':
                self.executionEnviornment.data[i] = '00'
```

Update our jump values with distance, then backpatch jumps

Update static table, add used variable to static area. Backpatch env with updated hex values