

Deklarierte Namen in MicroJava



Programm	Program()	
Konstanten	ConstDecl()	
Globale Variablen	VarDecl()	level = 0
Klassen	ClassDecl()	
Felder	VarDecl()	level = 1
Methoden	MethodDecl()	
Formale Parameter	FormPars()	
Lokale Variablen	VarDecl()	level = 1

Wird ein Name deklariert, wird er in die Symbolliste eingefügt

Objektknoten



```
class Obj {
    enum Kind {
        Con, Var, Type, Meth, Prog
    }

    Kind kind;
    String name;
    Struct type;
    int val; // Con: value
    int adr; // Var, Meth: address
    int level; // Var: 0 = global, 1 = local
    int nPars; // Meth: number of parameters
    // Meth: parameters and local objects
    // Prog: global variables, constants,
    // classes and methods
    Map<String, Obj> locals;
    List<Integer> fixupList; // Meth: Uses of fwd. decl. M.
}
```

Strukturknoten und Scope-Knoten



```
class Struct {
    enum Kind {
        None, Int, Char, Arr, Class
    }
    Kind kind;
    Struct elemType; // Arr: element type
    Map<String, Obj> fields; // Class: list of fields

    int nrFields() { return fields.size(); } // Class
}
```

```
class Scope {
    Scope outer; // next outer scope
    Map<String, Obj> locals; // list of objects in this scope
    int nVars; // number of variables in this scope
}
```

Symboltabelle



```
class Tab {
    public static final Struct
        noType, intType, charType, nullType;
    public Obj noObj, chrObj, ordObj, lenObj;

    public Parser parser; // target for errors
    public Scope curScope; // current scope
    private int curLevel; // nesting level of current scope

    public Tab(Parser parser);
    public void openScope();
    public void closeScope();
    public Obj insert(Obj.Kind kind, String name, Struct type);
    public Obj find(String name);
    public Obj findField(String name, Struct type);
}
```

Füllen der Symbolliste



```
/** varDecl = Type ident { "," ident } ";" . */  
private void varDecl() {  
    Type();  
    check(ident);  
  
    while (sym == comma) {  
        scan();  
        check(ident);  
    }  
    check(semicolon);  
}
```

Füllen der Symbolliste



```
/** varDecl = Type ident { "," ident } ";" . */
private void varDecl() {
    Struct type = Type();
    check(ident);
    tab.insert(Obj.Kind.Var, t.str, type);
    while (sym == comma) {
        scan();
        check(ident);
        tab.insert(Obj.Kind.Var, t.str, type);
    }
    check(semicolon);
}
```

Symbolliste verwenden



```
/** Type = ident [ "[" "]" ] . */  
private void Type() {  
    check(ident);
```

```
    if (sym == lbrack) {  
        scan();  
        check(rbrack);
```

```
    }
```

```
}
```

Symbolliste verwenden



```
/** Type = ident [ "[" "]" ] . */
private Struct Type() {
    check(ident);
    Obj o = tab.find(t.str);
    if (o.kind != Obj.Kind.Type) {
        error(NO_TYPE);
    }
    Struct type = o.type;
    if (sym == lbrack) {
        scan();
        check(rbrack);
        type = new Struct(type);
    }
    return type;
}
```


Klassen



```
/** ClassDecl = "class" ident "{" {VarDecl} "}" . */  
private void ClassDecl() {  
    check(class_);  
    check(ident);  
  
    check(lbrace);  
  
    while (sym == ident) {  
        VarDecl();  
    }  
    check(rbrace);  
  
}
```

Klassen



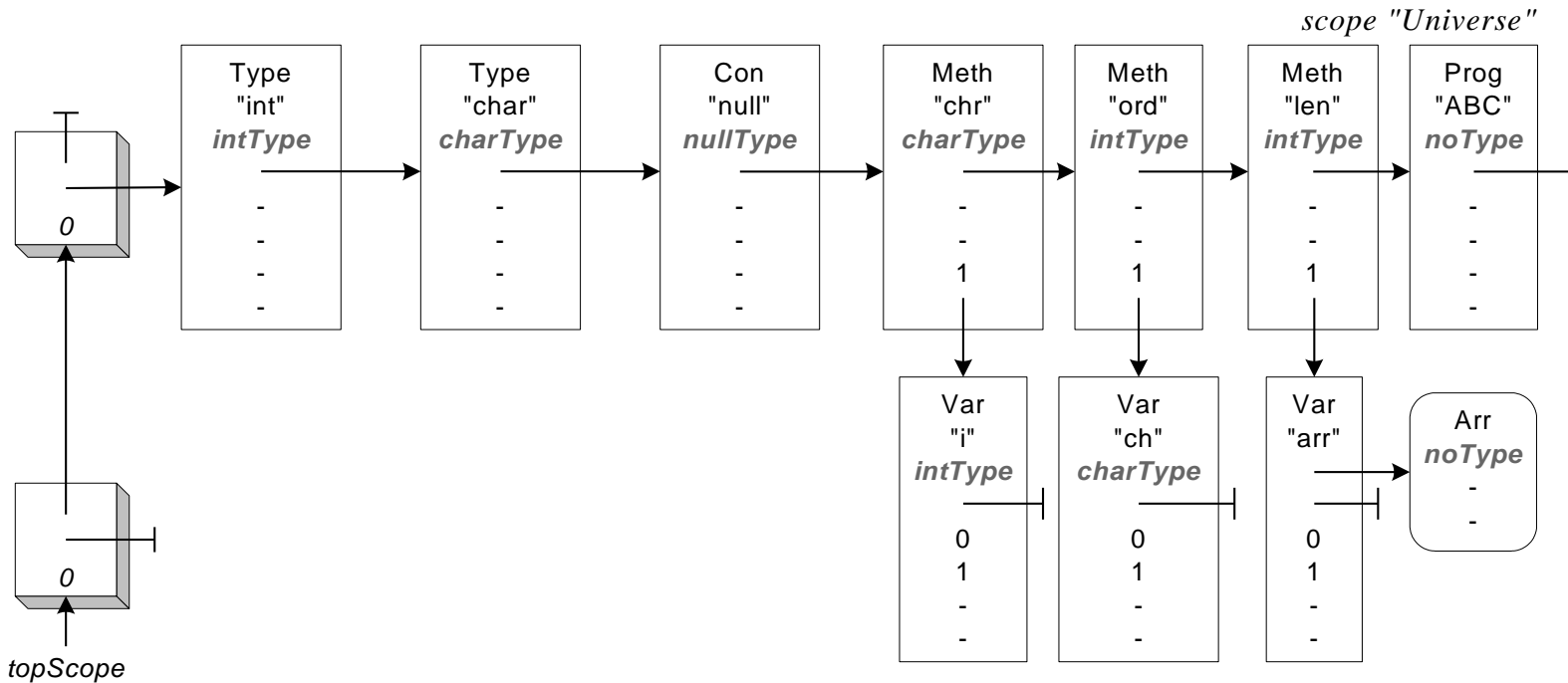
```
/** ClassDecl = "class" ident "{" {VarDecl} "}" . */
private void ClassDecl() {
    check(class_);
    check(ident);
    Obj clazz = tab.insert(Obj.Kind.Type,
        t.str, new Struct(Struct.Kind.Class));
    check(lbrace);
    tab.openScope();
    while (sym == ident) {
        varDecl();
    }
    check(rbrace);
    clazz.type.fields = tab.curScope.locals;
    tab.closeScope();
}
```

Beispiel: Symbollistenaufbau

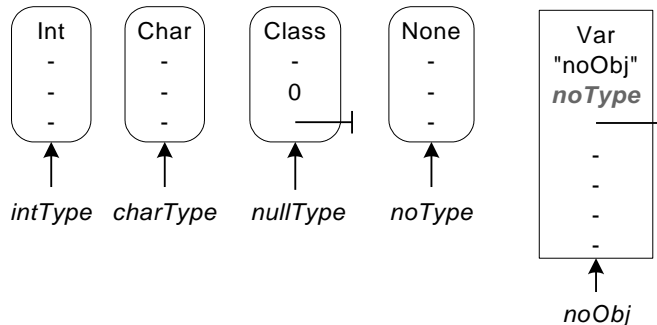


```
program ABC ①
  char[] c;
  int max;
  char npp;
{
  int put ② (int x) { ③
    X++;
    print(x, 5);
    npp = 'C';
    return x;
  } ④
} ⑤
```

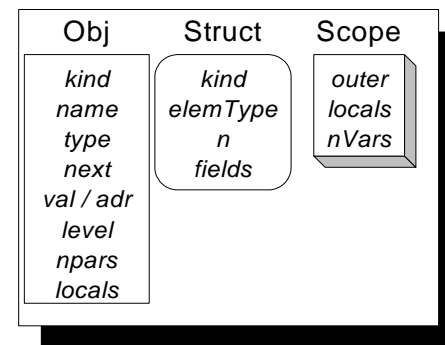
Beispiel: Bei Punkt ①



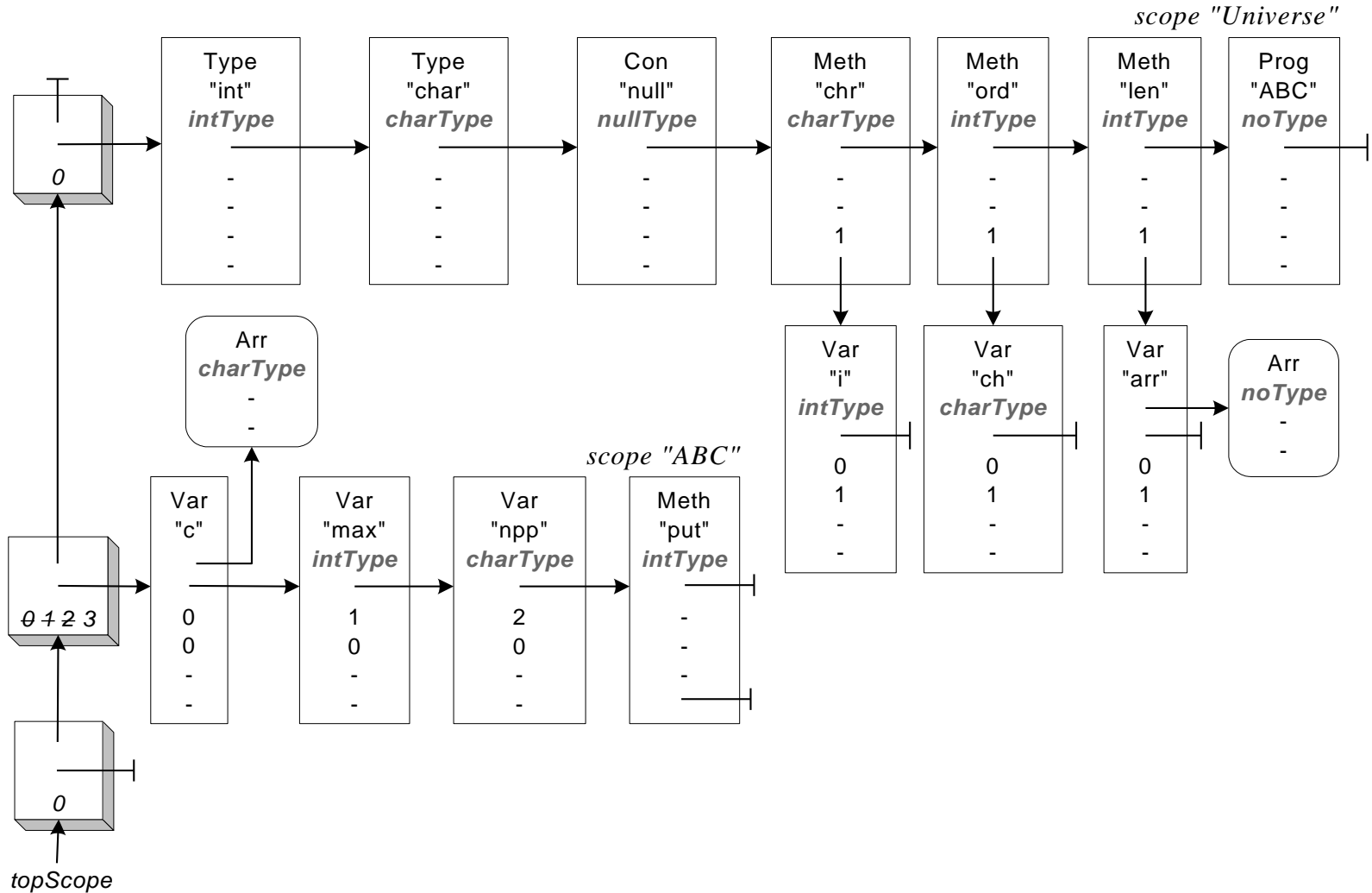
Vordefinierte Typen und Objekte:



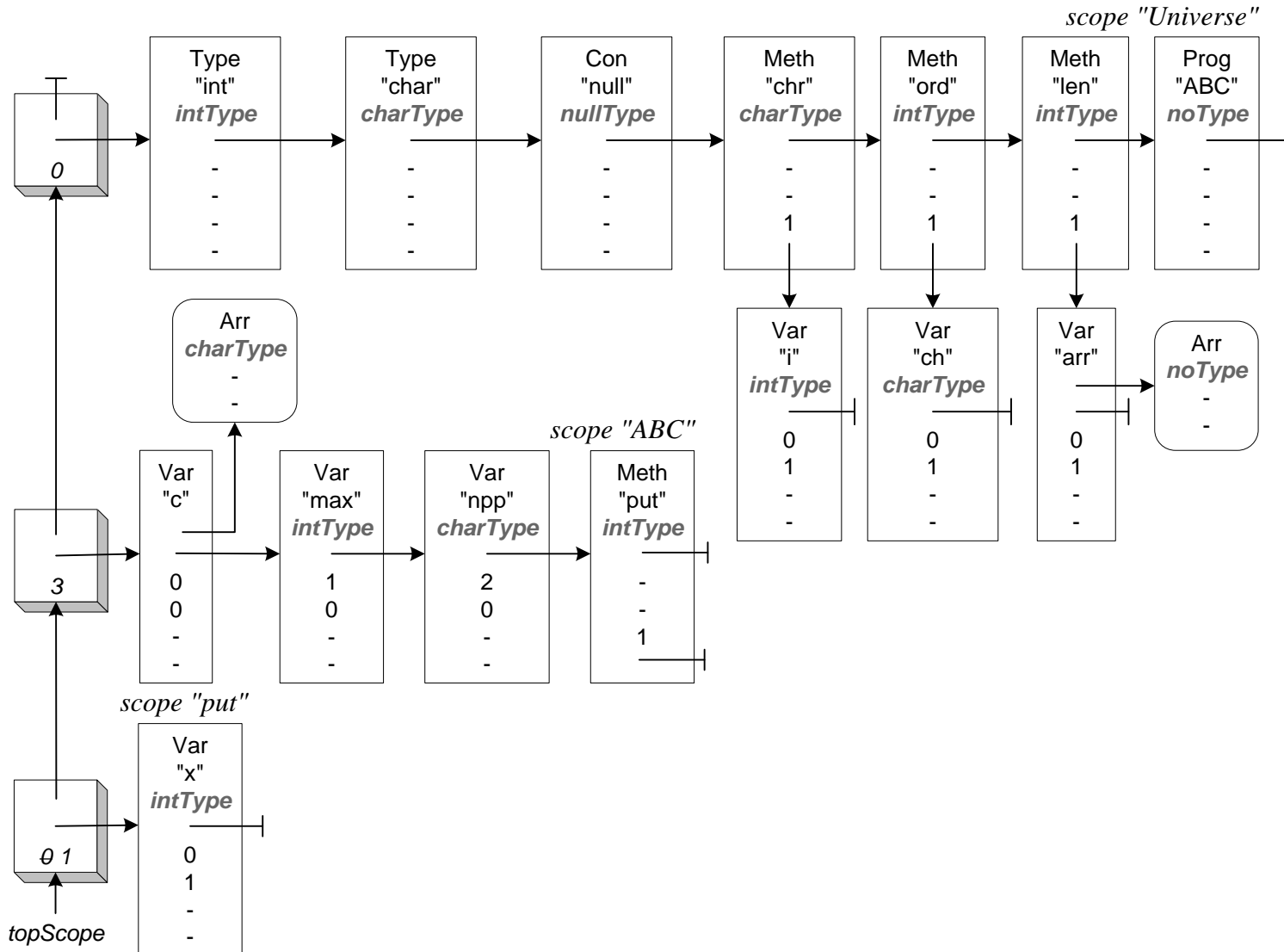
Struktur der 3 Knotenarten:



Beispiel: Bei Punkt ②



Beispiel: Bei Punkt ③



Beispiel: Bei Punkt ⑤

