

CS 410: Homework 4

Fall 2006 [Bono] **Due:** Wed., November 15, 2006, start of class

Problem 1

Problem: Write a code-generation routine for a new infix operator **min**. Min returns the minimum of its two integer operands. Here is an example of its use

```
int minVal = (4*y+7) min (x+g); cout << (10 min 20); //
prints 10
cgen( e1 min e2 ) =
```

Solution

```
cgen(e1)
sw $a0 0($sp)
addiu $sp $sp -4
cgen(e2)
lw $t0 4($sp)
addiu $sp $sp 4
bgt $t0 $a0 label
move $a0 $t0
label :
```

Note:Result has to be in \$a0

Problem 2

Consider the following classes for a C++ program.

```
class Foo { public: virtual void meth1(); virtual void
meth2(); . . . };

class Bar : public Foo { public: virtual void meth2(); virtual
void meth3(); . . . };

class Blob : public Bar { public: virtual void meth1(); virtual
void meth3(); virtual void meth4(); . . . };
```

Part A. Recall that to do code generation for virtual function binding correctly we need some run-time data structures called method tables. Show the contents of the method tables for classes Foo, Bar, and Blob. Assume we are using the following naming scheme:

- o method table for class X is located at address denoted by label X_methTab
- o method y defined in class X is located at address denoted by label X.y

Part B

	Foo_methTab:	Bar_meth:	Blob_meth:
0	Foo.meth1	Foo.meth1	Blob.meth1
4	Foo.meth2	Bar.meth2	Bar.meth2
8		Bar.meth3	Blob.meth3
12			Blob.meth4

Part B. For the following method call, circle the exact entry in the exact table that is used when we run the generated code. That is, circle the correct entry from your answer to part A.

```
Foo *p = new Bar(); p->meth1();
```

Soln :As shown above

Part C. If we change the above code to the code below (the part that changed is shown in *italics*), it will no longer compile. What is the error and what part of the compiler would catch the error?

```
Foo *p = new Bar(); p->meth3();
```

Soln:

No function “meth3” is defined for class ‘Foo’. It is detected by semantic analyzer.