Prof. Jingke Li (FAB 120-06, li@cs.pdx.edu); Class: MW 2:00-3:50pm @ FAB 40-07; Office Hr: MW 1-2pm & by appt.

Lab 8: Programming with Chapel (Part 2)

In this lab, we are going to program with the domain and locale features of the Chapel language. The documents for domain maps are not included in the language's specification file, but can be found at <http://chapel.cray.com/docs/latest/modules/dists/>.

Download and unzip the file `lab8.zip` from D2L. You'll see a `lab8` directory with some program files.

Demo Programs

The files `dmap[12].chpl` and `locale[1-4].chpl` are the domain map and locale demo programs from the lecture. Read, compile, and run them. *E.g.*

```
linux> make dmap1
chpl -o dmap1 dmap1.chpl
linux> ./dmap1 -nl 4
...
```

Change the parameters in one or two of these programs in any way you see fit, and see the effects.

Programming Exercises

1. Write a program, `locales.chpl`, to print out the *id*, *name*, and *numCores* information of all the locales used in the program's execution. Here is a sample run of this program:

   ```
   linux> ./locales -nl 6
   Locale 0: electron (with 8 cores)
   Locale 1: bevatron (with 8 cores)
   Locale 2: boson (with 8 cores)
   Locale 3: cosmotron (with 8 cores)
   Locale 4: cyclotron (with 8 cores)
   Locale 5: catron (with 8 cores)
   ```

2. Consider the following code extracted from `dmap2.chpl`:

   ```
   config const n = 8;
   const D = {1..n, 1..n};
   const BD = D dmapped Block(D);
   var b: [BD] int;
   forall e in b do e = here.id;
   writeln(b);
   ```

   When executed with `-nl 4`, it produces the following output:

   ```
   0 0 0 0 1 1 1 1
   0 0 0 0 1 1 1 1
   0 0 0 0 1 1 1 1
   0 0 0 0 1 1 1 1
   2 2 2 2 3 3 3 3
   2 2 2 2 3 3 3 3
   2 2 2 2 3 3 3 3
   2 2 2 2 3 3 3 3
   ```

Now write a new program, `border.chpl`, that produces a similar output except that the border elements are displayed with a special chosen value, `bval`. A sample run is shown below:

```
linux> ./border --bval=9 -nl 4
9 9 9 9 9 9 9 9
9 0 0 0 1 1 1 9
9 0 0 0 1 1 1 9
9 0 0 0 1 1 1 9
9 2 2 2 3 3 3 9
9 2 2 2 3 3 3 9
9 2 2 2 3 3 3 9
9 9 9 9 9 9 9 9
```

Note that the border display should be independent from the domain map and locale setting, *i.e.*, no matter what domain map or how many locales the program uses, the border display should stay the same.

Test your program with different domain sizes, different domain maps, and different locale numbers.