**Blue Waters Petascale Semester Curriculum v1.0**

**Unit 4: OpenMP**

**Lesson 8: Markov chains, Matrix multiply**

**Exercise Instructions for Students**

*Developed by Paul F. Hemler for the Shodor Education Foundation, Inc.*

Use the matrix multiplication routine to compute and display the transition matrix for the water vat problem described in the instructor guide for .

Compute the distributions for the same values of *n*, that is,

Draw the state diagram for an animal that can be eating (E), resting (R), or playing (P). The animal eats 40 percent of the time, rests another 40% of the time, and the rest of the time it is playing. If the animal is eating there is a 50 percent chance it is still eating, a 35 percent chance the animal is resting and a 15 percent chance it is playing after an hour. If the animal is resting there is a 50 percent chance it will be eating, a 30 percent chance it will still be resting, and a 20 percent chance it will be playing after an hour. Finally, if the animal is playing there is a 70 percent chance it will be eating, a 20 percent chance it will be resting and 10 percent chance it will be playing after an hour.

What is the transition matrix for the animal described above?



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*Browse and search the full curriculum at*[*http://shodor.org/petascale/materials/semester-curriculum*](http://shodor.org/petascale/materials/semester-curriculum)

*We welcome your improvements! You can submit your proposed changes to this material and the rest of the curriculum in our GitHub repository at*[*https://github.com/shodor-education/petascale-semester-curriculum*](https://github.com/shodor-education/petascale-semester-curriculum)

*We want to hear from you! Please let us know your experiences using this material by sending email to* [*petascale@shodor.org*](mailto:petascale@shodor.org)