deep se
dependable evolvable pervasive software engineering group

Exercise Session (MPI) – π approximation

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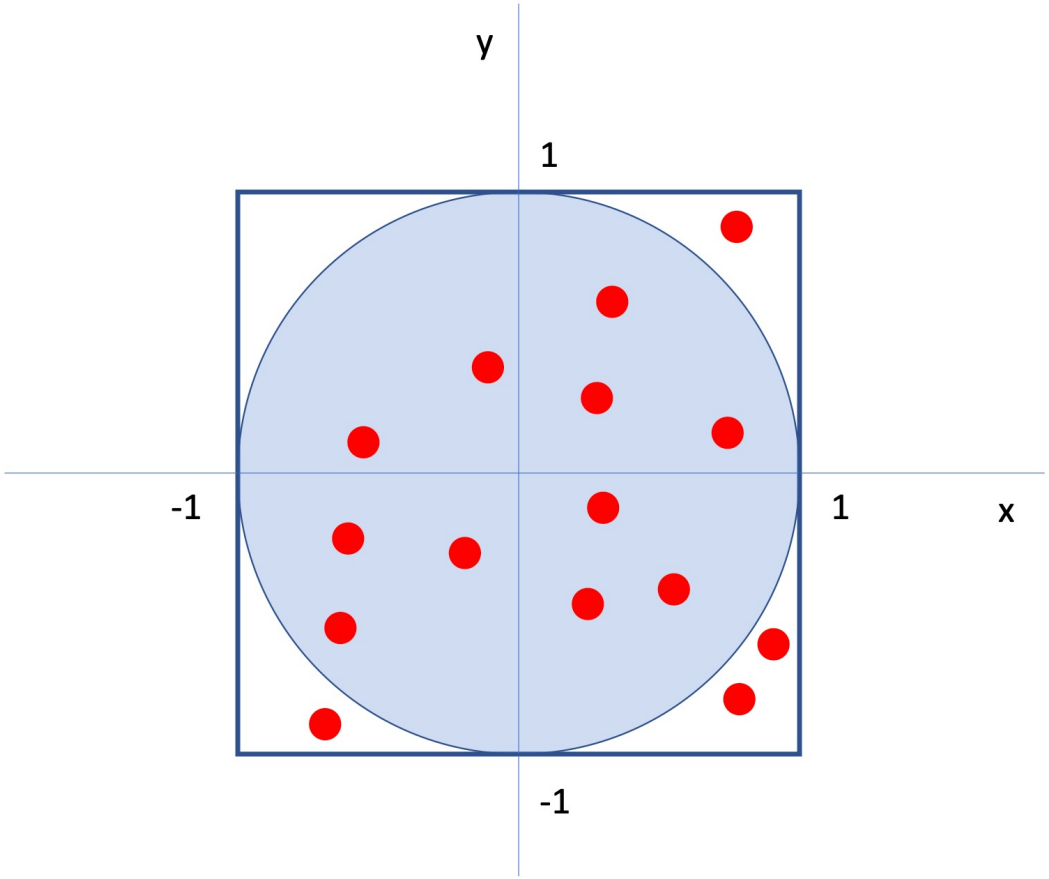
Goal

- Implement a parallel program to approximate π.



$$\frac{\text{Area}_{\text{circle}}}{\text{Area}_{\text{square}}} = \frac{\pi \cdot r \cdot r}{4 \cdot r \cdot r} = \frac{\pi}{4}$$

Dartboard

Algorithm (serial version)

```
darts = /* a large number */
score = 0    /* how many times the dart falls in the circle */
for (n = 1; n <= darts; ++n)
      generate a random x-coordinate in [-1, 1]
      generate a random y-coordinate in [-1, 1]
      if (x-coordinate,y-coordinate) is in the circle
            score++
      end if
end for
pi = 4 * score / darts
```

→ Repeat for `n_iterations` times and compute the average

Program assumptions and requirements

- Assume that the number of iterations is a multiple of the number of available processes
- The number of iterations and the number of darts are provided at the command line