

# PARALLEL MOVIE RENDERING WITH POV-RAY (10 POINTS)

The Persistence of Vision Raytracer (POV-Ray) is a free tool for creating high-quality three-dimensional graphics (see <http://www.povray.org>). A POV-Ray movie is described by two important files:

- *POV* files are descriptions of POV-Ray scenes;
- *INI* files are rendering configuration files that contain (among others) four important attributes:
  - *Initial\_Frame*: the first frame of the movie;
  - *Final\_Frame*: the total number of frames in the movie;
  - *Subset\_Start\_Frame*: the starting frame to be rendered by the current job;
  - *Subset\_End\_Frame*: the end frame to be rendered by the current job.

1. Choose one parallel machine and render the PNG images corresponding to the INI file on one slave processor using the locally available batch queuing system (i.e. PBS, Torque, SGE):

`povray scherk.ini +Ischerk.pov +Oscherk.png +FN +W1024 +H768` (1 point)

2. Merge all PNG files into one single gif file using the gm program;

`gm convert -loop 0 -delay 0 *.png scherk.gif` (1 point)

3. Measure the execution time of steps 1-2 and call it  $T_{seq}$ ; (1 point)

4. Choose a large total number of frames in the INI file and write a small program that equally splits the frames based on the number of processors of the parallel machine. Assuming  $M$  frames and  $N$  processors, each processor labeled  $p \in [1..N]$  will receive  $\left\lfloor \frac{M}{N} \right\rfloor + \begin{cases} 1, & p \leq M \% N \\ 0, & p > M \% N \end{cases}$  frames to render; (2 point)

5. Render the PNG files in parallel on at least 16 parallel processors using the job submission system on karwendel.dps.uibk.ac.at: qsub myjobdescription (1 point)

6. Measure the new execution time and call it  $T_{par}$ ; (2 points)

7. Calculate the speedup of your application as follows:  $S = \frac{T_{seq}}{T_{par}}$ ; (1 point)

8. Calculate the efficiency of your application as follows:  $E = \frac{S}{N}$ , where  $S$  is the speedup and  $N$  is the number of processors. (1 point)

**A report about your experiments including the programs developed (which are either user-friendly or have included descriptions) need to be handed in using OLAT till day before the next exercise at 16:00! Make sure your report file contains: Your name, Parts solved of the sheet and Total points for this sheet achieved. To not submit png or gif files! Be aware that 60% of exercises are needed to pass the course.**