Motivation:

Cell cycle simulation using HPC techniques had been successfully done using supercomputers [2]. The existing techniques used to model cell cycle is not user-friendly for biologists. Also, there is no way in which a schematic diagram of a part of the model can be converted to corresponding mathematical model for simulation purposes. We seek prospects of interfacing supercomputers with tangible interfaces to serve this purpose.

Interfacing Grid with Tangible Workspace:

<table>
<thead>
<tr>
<th>Tangible Workspace (TW)</th>
<th>Back-end Software GUI</th>
<th>Design considerations for TW</th>
<th>Handling simulations, Computational Issues, back-end grid-connectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Includes both visual+physical components</td>
<td>• needs to save the physical model drawn on the tangible workspace</td>
<td>• the material for the workspace area</td>
<td>• comparing results of mathematical model and experimental data</td>
</tr>
<tr>
<td>• Easy for human manipulation</td>
<td>• needs to retrieve a saved model for further editing</td>
<td>• how the objects will hold on to the workspace</td>
<td>• very hard to set numerical values of the &quot;parameters&quot; in the mathematical model equations to create more accurate representations of steps in each cell cycle</td>
</tr>
<tr>
<td>• Maintains back-end connectivity with cluster computers, and grid resources for simulation.</td>
<td>• needs to create new models, if necessary, and save it.</td>
<td>• how the objects will sense presence of each other</td>
<td></td>
</tr>
</tbody>
</table>

Basic Workflow

1. Actual physical design of a cell-cycle model on the tangible interface workspace;
2. Saving of the physical model as a softcopy for future retrieval, using controls available on the workspace;
3. Editing the saved model in a GUI, if needed;
4. Choosing a cell-cycle model as input to the parallel algorithm for simulation and verification of the model’s correctness;
5. Submitting the resulting compute job description to the grid;
6. Collecting the output from the compute resources for further analysis and archiving.

References


