

Опыт применения добровольных вычислений для решения вычислительных задач с помощью эволюционного алгоритма

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Experience of using voluntary computations to solve computational problems using an evolutionary algorithm

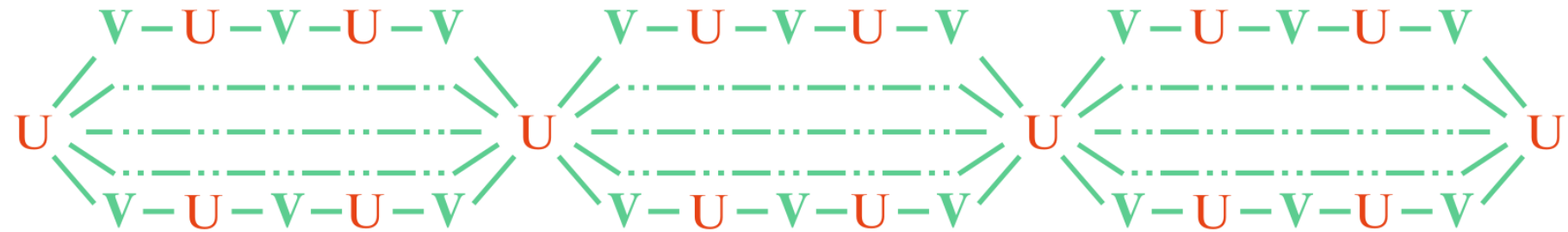
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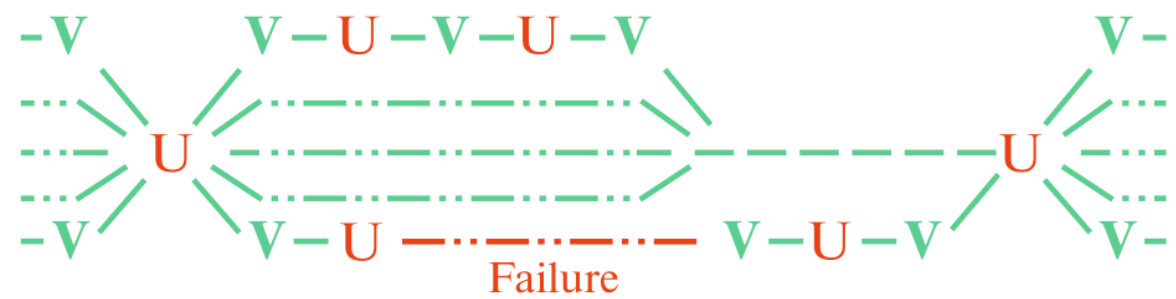
Oganov Artem, Skolkovo Institute of Science and Technology.

Kostenko Maksim, Skolkovo Institute of Science and Technology.

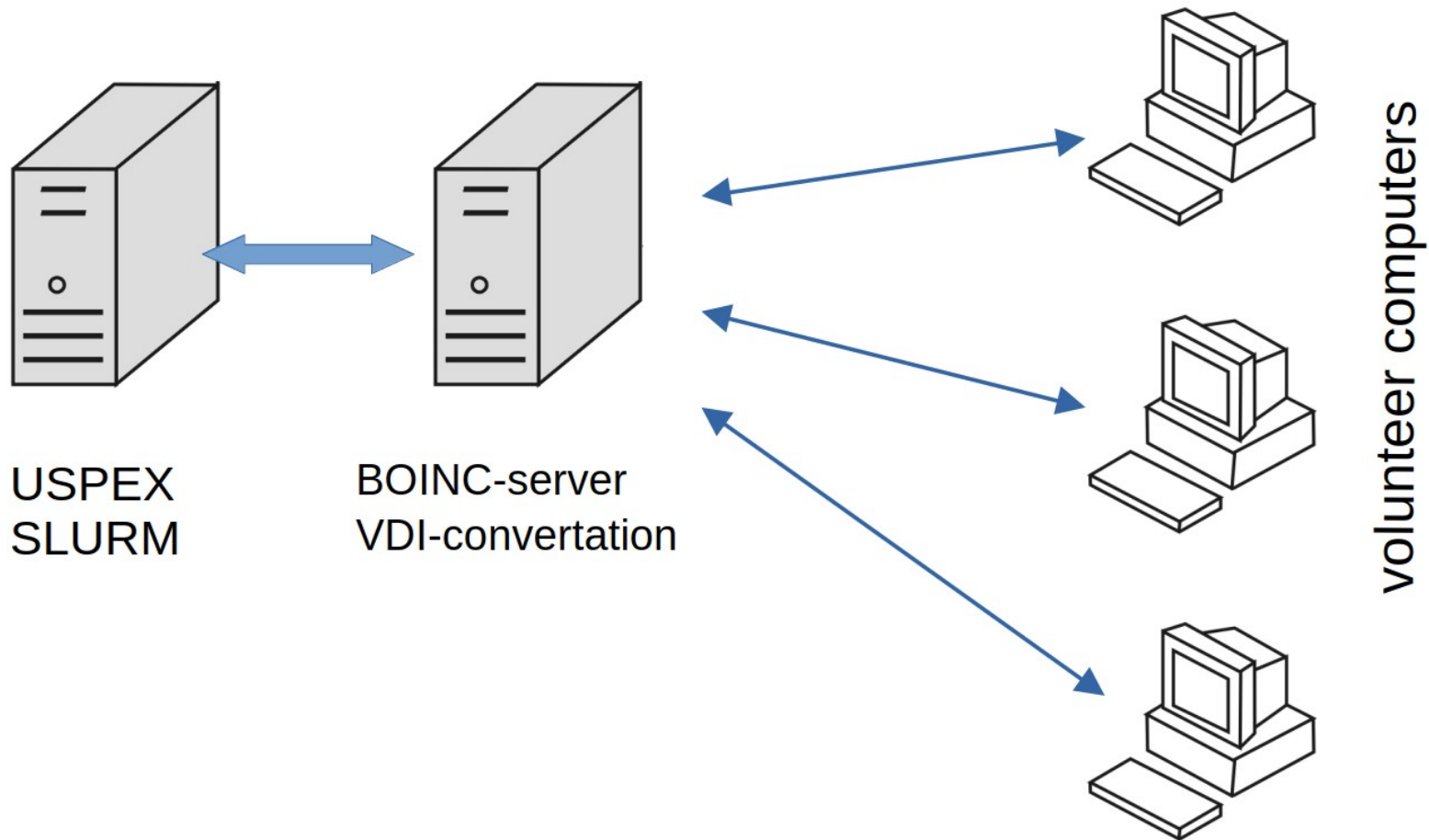
Evolutionary Algorithm



For One that is Missing There is no Spoiling a Wedding
Проблема «семеро одного не ждут»



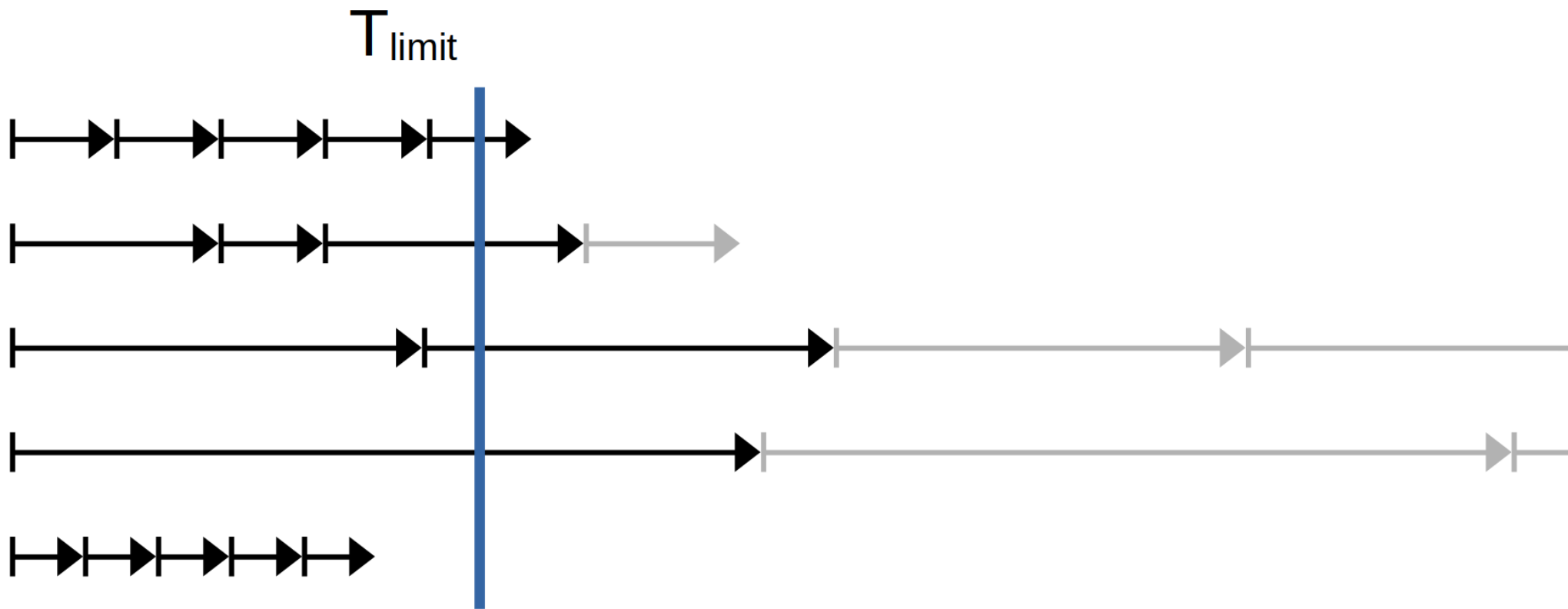
USPEX@HOME architecture



Control of computational complexity of BOINC tasks

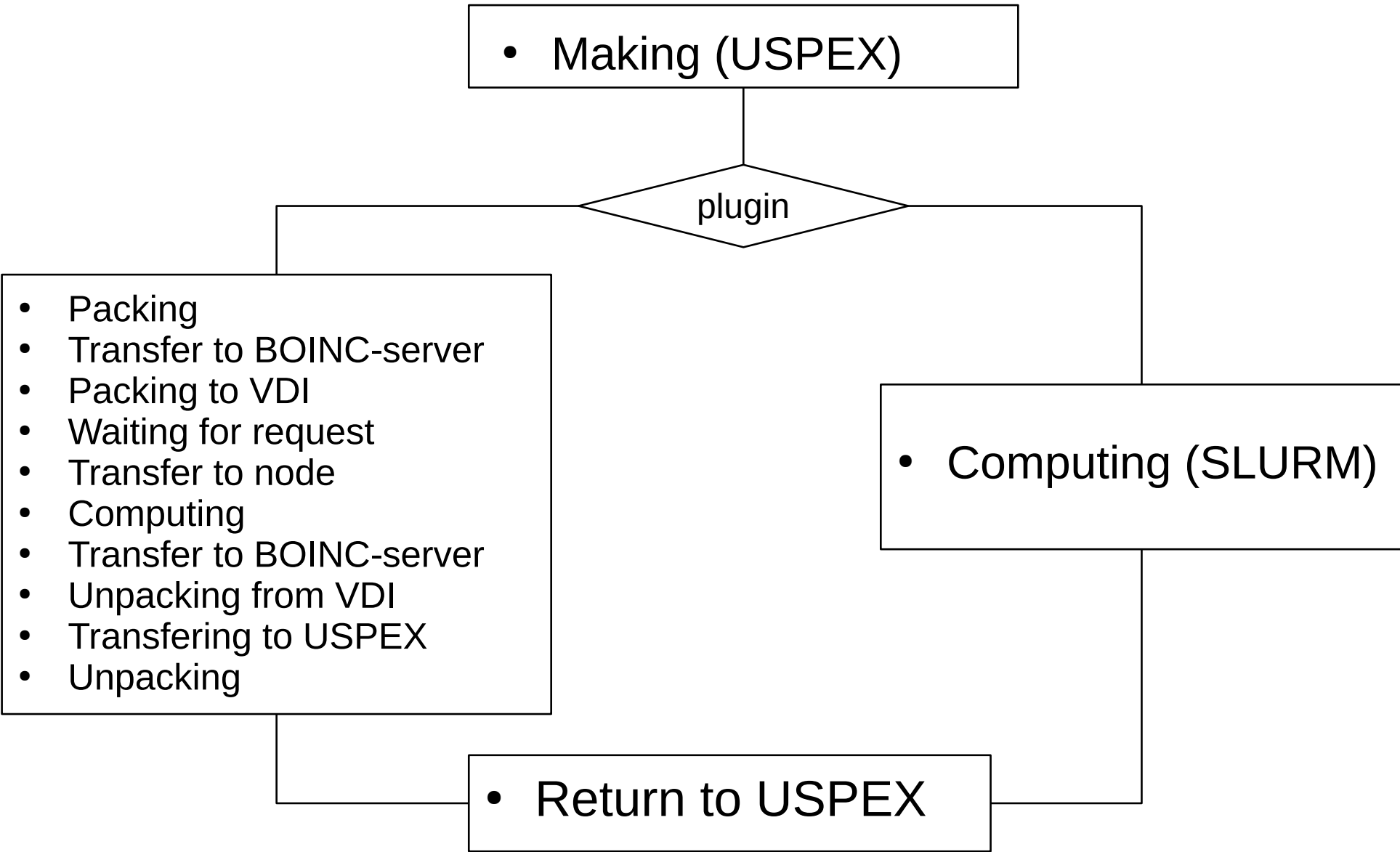
- **Paking** - combining a pre-set number of USPEX-tasks into one BOINC-task. On a computing node, the tasks are executed **sequentially**. This is the preferred approach for large numbers of tasks of low computational complexity.

Packing with time limit



Paking with time limit (example)

- *Minimum duration of USPEX-task: 10 min.*
- *Maximum duration of USPEX-task: 10 h.*
- **Packing for 5 tasks:**
- Minimum duration of BOINC-task: 50 min.
- Maximum duration of USPEX-task: 50 h.
- **Packing for 5 tasks within time limit 2 hours:**
- Minimum duration of BOINC-task: 50 min.
- Maximum duration of USPEX-task: $10 + 2 = 12$ h.

- Making (USPEX)
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- ```
graph TD; A[• Making (USPEX)] --> B{plugin}; B --> C[• Packing
• Transfer to BOINC-server
• Packing to VDI
• Waiting for request
• Transfer to node
• Computing
• Transfer to BOINC-server
• Unpacking from VDI
• Transferring to USPEX
• Unpacking]; B --> D[• Computing (SLURM)]; C --> E[• Return to USPEX]; D --> E;
```
- The flowchart illustrates the USPEX process. It begins with a rectangular box labeled '• Making (USPEX)'. A vertical line connects this box to a diamond-shaped decision node labeled 'plugin'. From the 'plugin' node, two paths emerge. The left path leads to a large rectangular box containing a list of steps: '• Packing', '• Transfer to BOINC-server', '• Packing to VDI', '• Waiting for request', '• Transfer to node', '• Computing', '• Transfer to BOINC-server', '• Unpacking from VDI', '• Transferring to USPEX', and '• Unpacking'. The right path leads to a rectangular box labeled '• Computing (SLURM)'. Both of these paths converge at a final rectangular box at the bottom labeled '• Return to USPEX'.

plugin

- Packing
- Transfer to BOINC-server
- Packing to VDI
- Waiting for request
- Transfer to node
- Computing
- Transfer to BOINC-server
- Unpacking from VDI
- Transferring to USPEX
- Unpacking

- Computing (SLURM)

- Return to USPEX



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