THE STORY OF SUPERCOMPUTING

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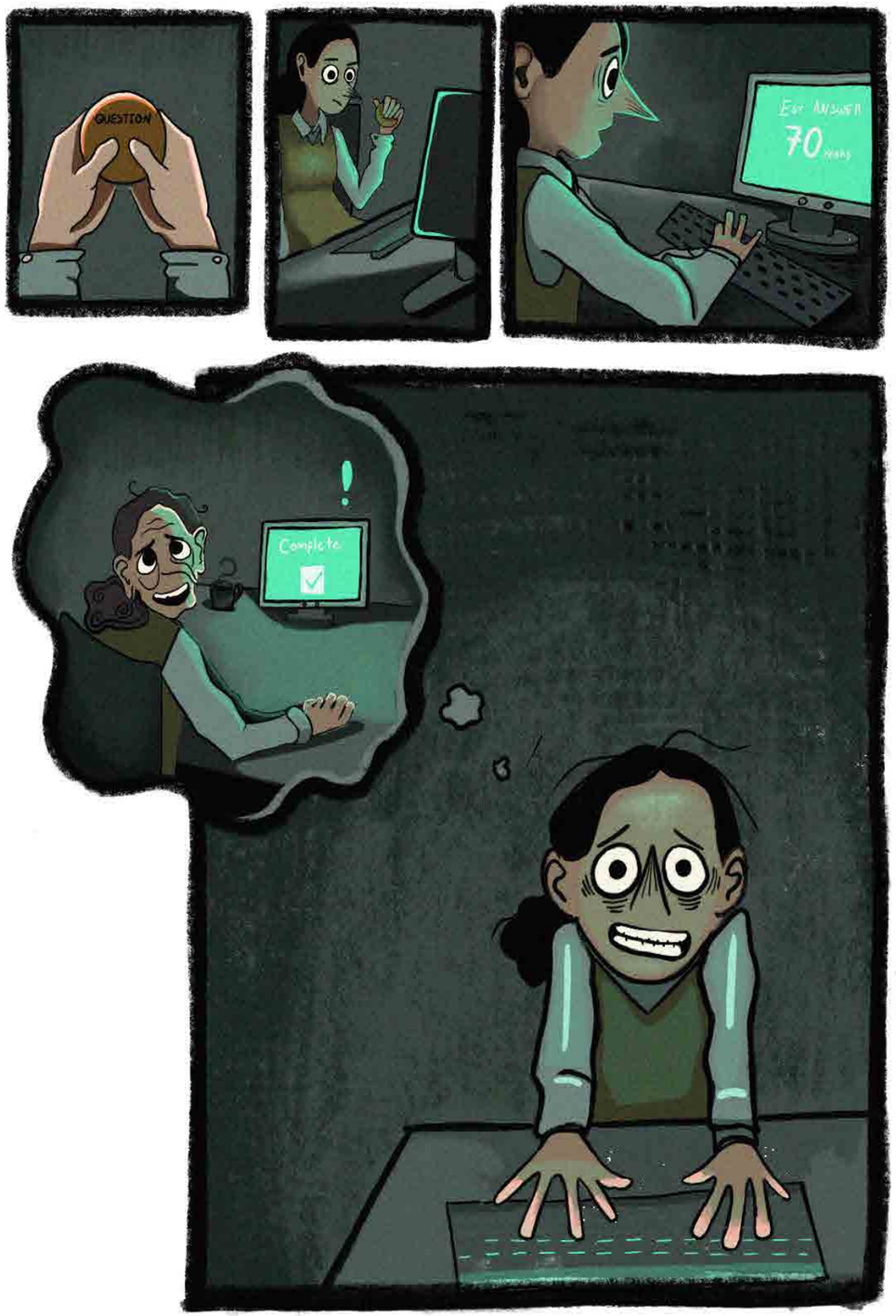


Supercomputers are much more powerful than regular laptop computers, which is why many scientists need them for research.

Scientists pose “questions,” known as programs, that hold different tasks for the computer to complete. Many computers are too slow to answer these questions in a reasonable amount of time.

In fact, it can take decades for a personal computer to answer a complex question. Clearly, this scientist needs to find a supercomputing system.

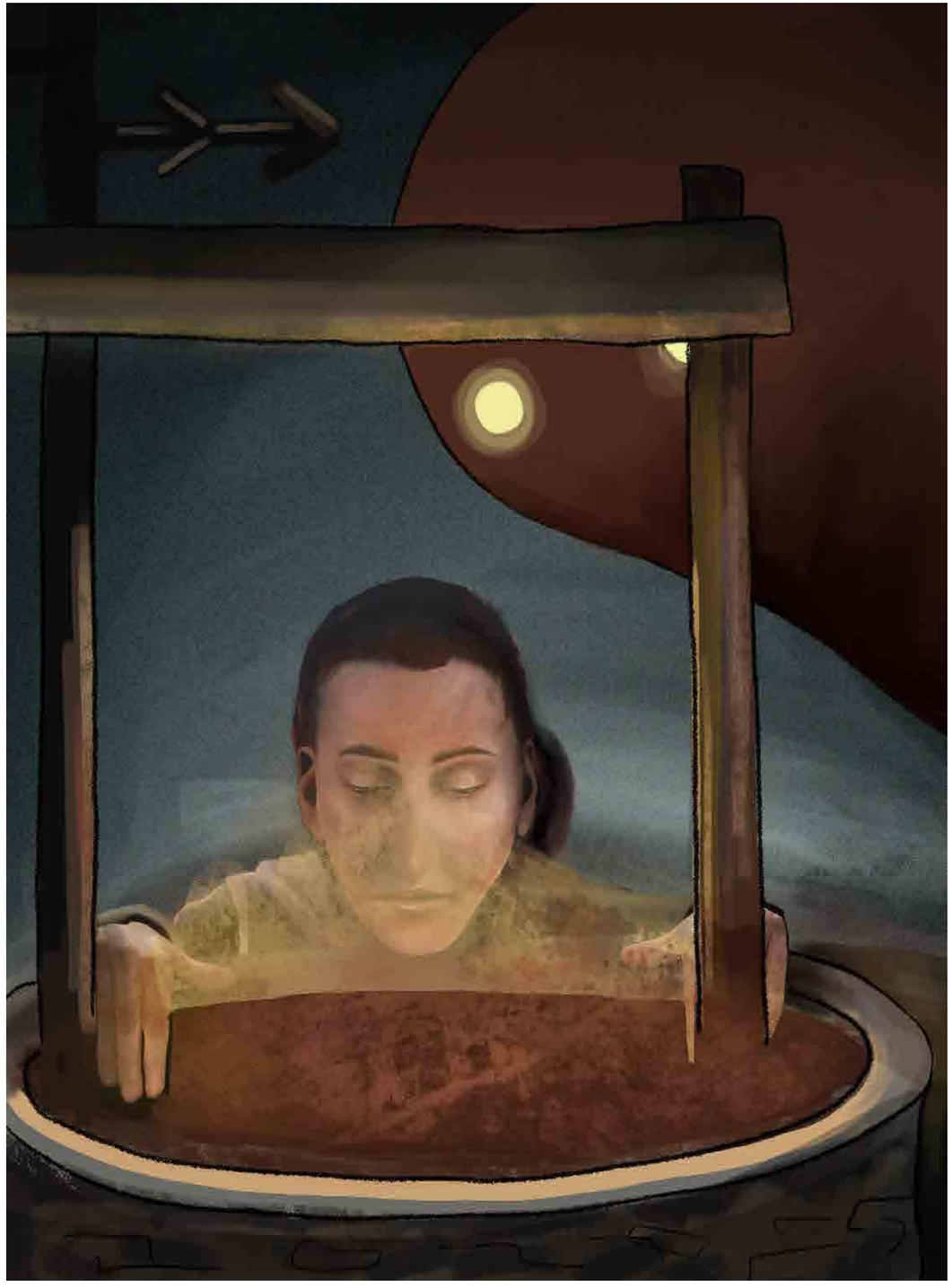
Fortunately for her, there is a supercomputer nearby. The scientist gathers up the questions she needs answered and takes them to the computing system.

However, before a question can be submitted, the user has to translate the question into a computer language. She spends a lot of time learning how to communicate with the computer and then writes a program in computer code. She uses the code to ask the machine her questions.

The scientist is about to submit her programs to the supercomputer! Using lines of coding language, she can interact with the system by telling it the principles behind what needs to be done.

Now, the scientist is able to submit her programs. Supercomputers are massive networks of hardware and software components. These components work together to complete the programs.

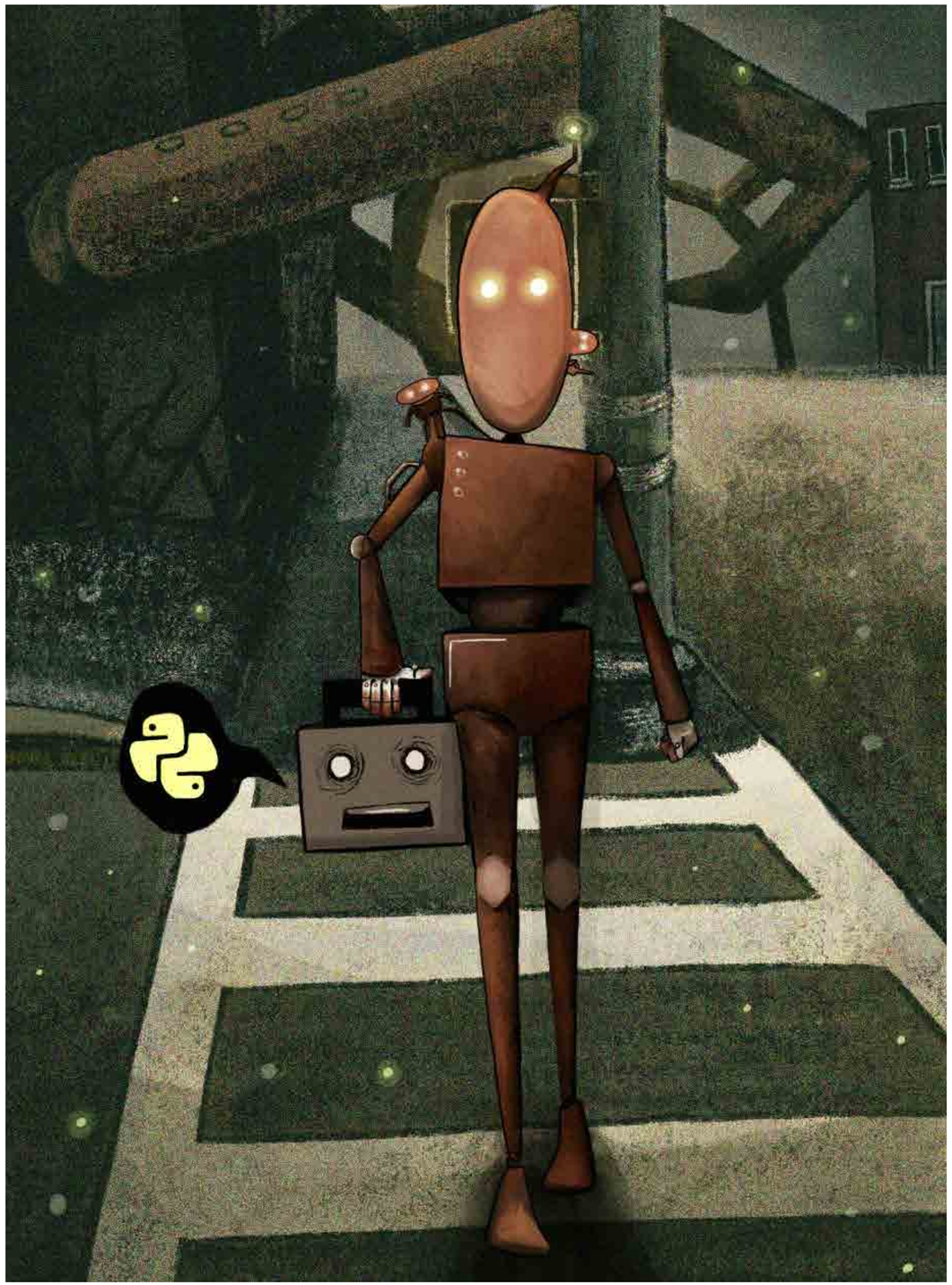
Once a scientist submits programs to these systems, the components almost immediately begin working towards answering them. This is similar to how a big city contains many people who each complete different tasks in order to keep the city running smoothly.



The supercomputer is filled with many smaller computers, called nodes, that are connected together. At the center of the supercomputer is the scheduler. The scheduler constantly receives information from many scientists and creates a schedule of tasks for the supercomputer.

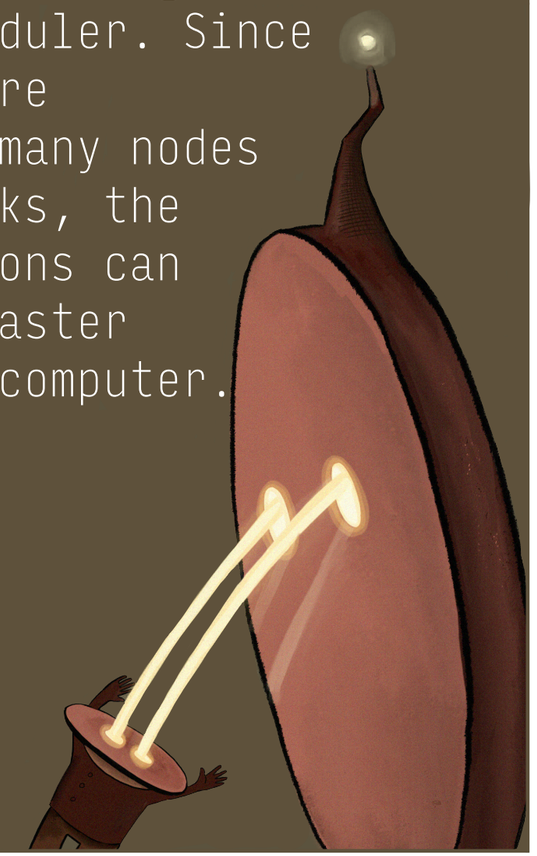
Programs wait in a queue until they are sorted and distributed to the nodes. Most programs are too big for one node, so the scientist writes her code to distribute the work among multiple nodes.

The scheduler is always communicating with the nodes, just as the nodes are always communicating with one another.



Nodes are either made up of only a CPU (the node's calculation engine), or a CPU and GPU (a second calculation engine). The CPU and GPU are in constant communication with each other, as with the rest of the system.

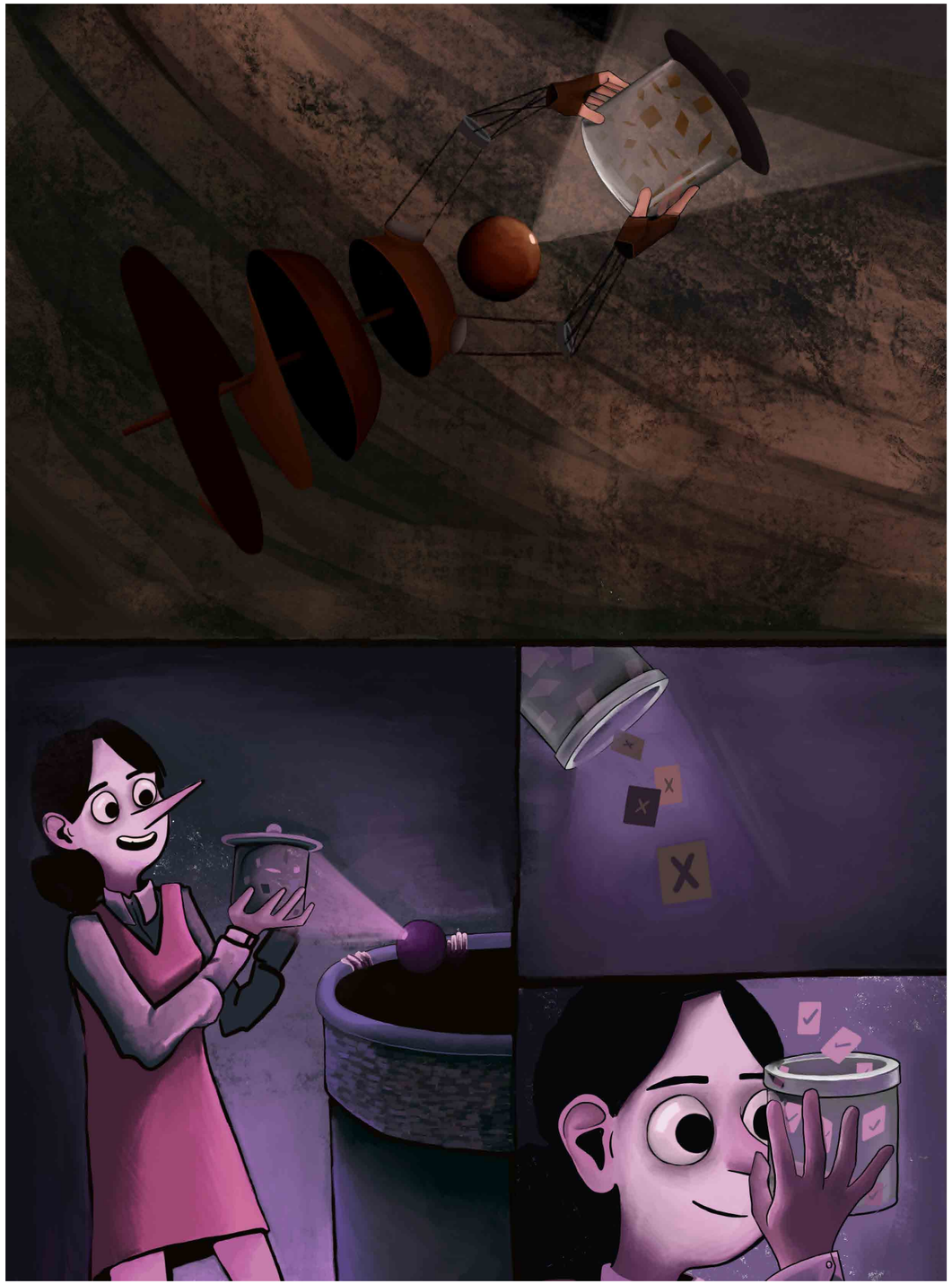
The nodes receive tasks given to them from the scheduler. Since larger questions are distributed among many nodes in the form of tasks, the scientist's questions can be answered much faster than on a regular computer.



Supercomputers have libraries inside of them as well. The library is filled with different collections of data and other information that might be needed for the nodes to successfully complete their assigned tasks.

After the supercomputing system completes all of the programs, the processed data becomes available for the scientist to use in her research projects.

The system delivers the finished product to the scientist in a more understandable format.



The scientist is delighted to receive her answers so quickly! Now she can filter out the parts that she does not need. Typically, when information is processed by the supercomputer, there is excess information alongside the usable results. After getting rid of parts she doesn’t need, she can use the workable results in her research!


NEW
WORLD

Word Bank

Scheduler: a software designed to schedule jobs submitted to the supercomputer. When a scientist submits a job, the scheduler sees the time and computer resources needed for the job and schedules it when resources are available.

CPU: a calculation engine that can solve computational problems.

GPU: similar to a CPU, but processes many pieces of data simultaneously. Ideal for graphics,like video games, but also for scientific computing!

Node: similar to a single computer. A node may contain one or more CPUs and/or GPUs along with other computer parts, like memory. Nodes can be grouped together to communicate with each other.

Supercomputer: a computer that performs at the maximum limits of what is currently possible. At ICER, our supercomputer divides tasks among many nodes that communicate with each other at super fast speeds.

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With supercomputing, there are virtually no limits to what we can accomplish!


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