

What is a data center?

A tale of a honey badger family



**Dedicated to the memory of
Sir Ken Robinson and the
humor of John Cleese.**

Elise, Nick and Ava, may you find
your creativity, joy and passion.

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To view this book online along with the
guide to the hidden references, please visit

Eaton.com/DataCenterBook

**I'M HIDDEN ON
EACH PAGE. CAN
YOU FIND ME?**



Yes, we're here!" Honey's dad, Huw, said as he pulled off the road.

"Wait, are you sure this is it?" Honey asked skeptically as she looked at the huge—but surprisingly boring—building. It looked nothing like she had expected.

"Where are the windows?"

"Computers don't need a view!" her father replied with a laugh. "Data centers are designed to look very plain from the outside," Honey's mom, Gabrielle, explained.

"And they are safer if they don't have windows."



**Data Center
Anthrax**



SECURITY BY SKYNET



Honey wasn't sure why a data center needed to be safe. "Safe from what?" she wondered.

As her dad stopped the car, Honey noticed there was even an armed guard! "Something very important must be inside," she thought. "Identification, please," the guard said, taking her dad's driver's license. "We've been expecting you. You can pick this up on your way out," he instructed, opening the gate for them.

After her father parked the car, Honey ran to the front of the building.

But when she tried to open the door, it wouldn't budge. "We need to ring the bell," her mom told her, pushing a button on a call box. Honey heard a loud buzzing sound and suddenly the door clicked open. An attendant named Daisy greeted them in the lobby to start their check-in process.





“There are several things we need to do before you can enter the data center,” Daisy explained. “To make sure that our employees and visitors are who we think they are, we rely on something called biometrics. Those are very specific body measurements and calculations. Let’s get started.”

First Daisy scanned their fingerprints. Next, she asked each family member to look inside a special machine, where beams of light moved across their eyes. Finally, their photos were taken and placed on individual badges. “Make sure you wear these at all times because the badges give you access to different areas of the data center,” Daisy said. “Now wait right here for your escort.”

A few minutes later, a tour guide entered the lobby and greeted the family.

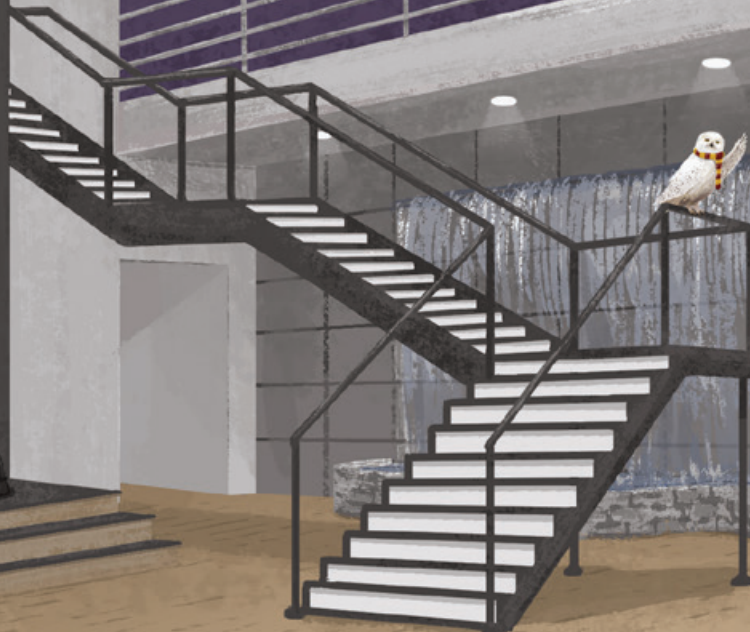
"Hello! My name is Oliver and I'm going to show you around today," he said.

"One of the most important things to know is that when it comes to security, data centers are kind of like Fort Knox."

"I learned about Fort Knox in school!" Honey said excitedly. "It's the most secure building in the entire nation and it's where all the gold is stored!"

"You're exactly right!" Oliver said. "And what's stored inside a data center is the 'gold' belonging to an organization. In other words, their most valuable information, such as customer data. Data centers also have to protect intellectual property," Oliver explained, "which are things like inventions, artistic works, or designs and names used by a company."

Initiative + Technology = INITECH

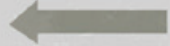


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**THIS
IS THE
WAY**



Oliver led the family across the room and stopped in front of a giant tube. Honey's eyes grew wide. "Daddy, this looks like that thing in the sci-fi movie you were watching the other day!" she said.

"Actually, this is called a mantrap," Oliver explained. "It weighs people to make sure nobody else is trying to sneak into the data center with them—we call that tailgating."

"My mom always tells my dad not to do that on the freeway," Honey interjected. Oliver smiled. "Also, the scale inside the mantrap is sensitive enough to tell if someone is carrying more when they leave than when they entered. That helps prevent theft." Oliver swiped his badge and the door to the mantrap opened.

After passing through the mantrap one at a time, the family emerged into a long hallway. There were doors as far as Honey could see. “Wow, this looks like a gigantic maze,” she said. “How do you know where to go?”

“Data centers are divided into specific blocks and often arranged by the type of activities being performed,” Oliver told her.



THX
1138

217



“What kinds of things happen in a data center?” Honey asked Oliver.

“Well, do you like to play Roblox on the computer?” he inquired. Honey nodded, that was her favorite game! “And do your parents sometimes buy things on their smart phones?” She nodded again. “Data centers are where the Internet lives, so all online activities are processed inside of them—from credit card transactions to streaming videos to playing games,” Oliver explained.

“Even being able to do distance learning for school?” Honey asked. “Yes,” Oliver replied, “that is one of the many important things that occurs in a data center! Also, data centers make it possible for people to work from their homes.”

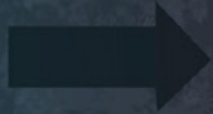
Oliver led the family through one door. “First we’re going to check out a data hall, which is a room that contains many, many racks of computers that we call servers.” The first thing Honey noticed was how loud it was. “What’s that roaring sound?” she asked.

“The noise comes from all of the equipment inside the racks,” Oliver explained. “It’s around 78 decibels in here. Do you know how loud that is?” Honey shook her head. “Well, a normal conversation is around 60 decibels, a barking dog is around 70 decibels and a screaming child is around 80 decibels.” Honey couldn’t believe the room was almost as loud as that awful wailing sound her friend’s baby brother was constantly making.





HEAT
MISER
AISLE



MR. SNOW
AISLE

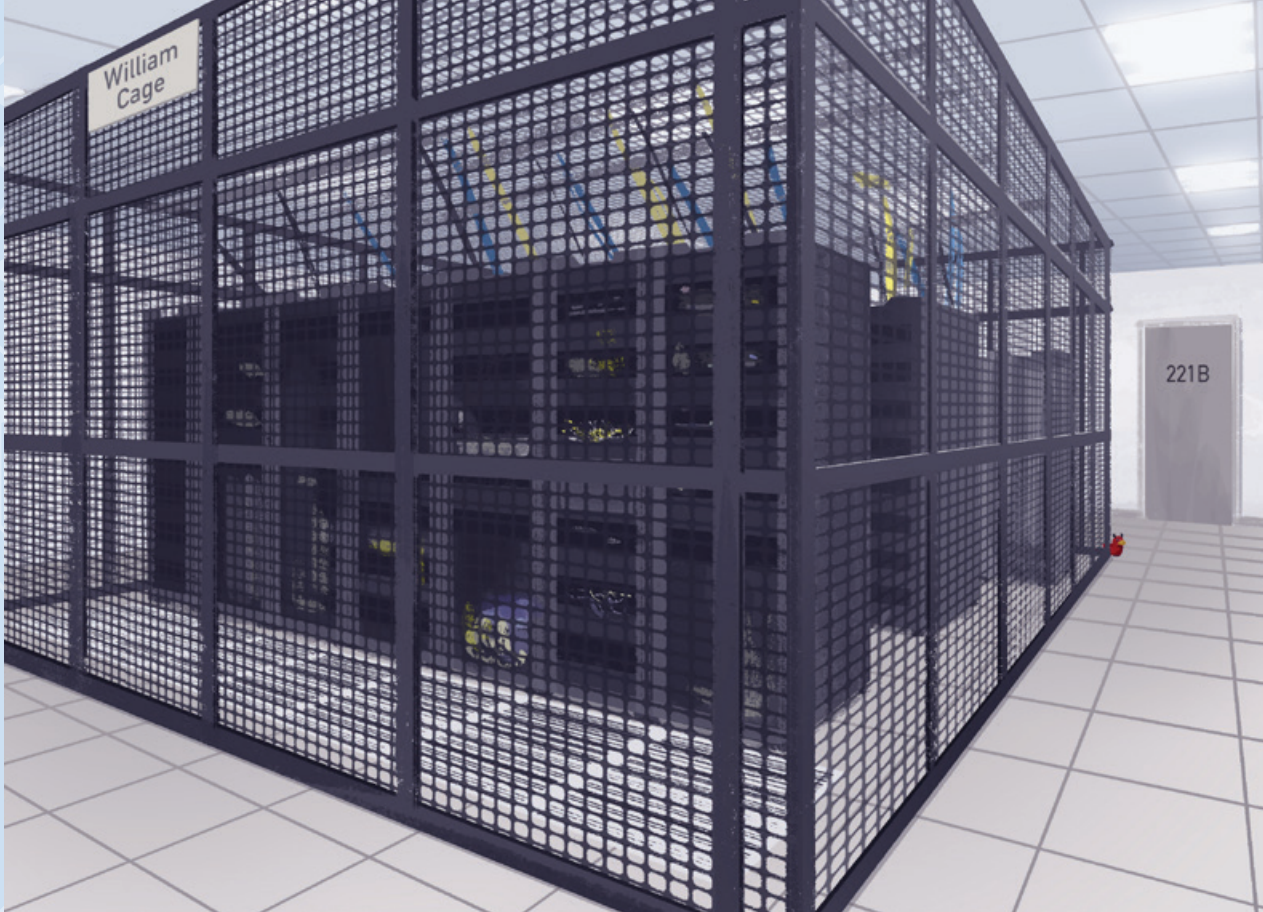


As she walked past the rows and rows of equipment, Honey felt bursts of warm air, followed by gushes of cold air. “Why does the temperature keep changing depending on where I’m standing?” she asked. “That’s a great question!” Oliver replied. “This hall uses what’s called a hot aisle/cold aisle design, which helps manage air flow,” he explained. “The equipment is less likely to overheat when the server racks are lined up in alternating rows, with cold air facing one way and hot air exhausts facing the other.”



Honey and her family followed Oliver back into the long hallway. “Does every company have its very own data center?” Honey asked. “That’s another terrific question,” Oliver said. “Some companies like Google and Facebook have their own. But other data centers, like this one, have the data center equipment of many companies inside.”

“Kind of like an apartment building?” Honey asked. “That’s exactly right!” Oliver responded. “Here, let’s take a look.”



“This is what we call a multi-tenant data center where different customers share the same facility,” Oliver said, leading the family into another room. **“For example, this space is reserved for one company that sells products on the Internet. All of its transactions are processed right here.”**



THIS IS A SINGLE PANE OF GLASS

Oliver continued down the hallway and opened yet another door. "Welcome to the network operation center, or what we call the NOC," he said. "This is the command center where we monitor everything."

"Hey, there's the data hall we just saw!" Honey pointed out excitedly. "It looks even bigger from up here!"



“The people here in the NOC are responsible for detecting and resolving any IT problems, and ultimately ensuring data center availability. That means that all of the functions supported by the data center are accessible to anybody who needs them, no matter what time it is,” Oliver explained.

“Like when my mom shops online late at night because my dad is sleeping and won’t know about it?” Honey asked innocently. “This might be a good time to move to our next stop on our tour...” Oliver said.

"Here in our 'meet-me-room' or MMR, we provide quick, reliable and cost-effective connections between our tenants and telecommunications companies. This is where all of the fiber is," Oliver said, guiding the family through the next door. **"Your photos, emails and credit card payments that people send come into and exit the data center here."**



Women: 25 grams per day

PUE Puffs


cable crispies

CARRIER NEUTRAL CRUNCH

Firewall Flakes

MW Bran

Men: 38 grams per day

A virtual room with a grey floor and walls. A large, fluffy white cloud is projected onto the back wall. A black metal truss ceiling holds several rectangular light fixtures. A yellow banner hangs from the ceiling. A small red fire alarm is on the ceiling, and a white snow owl is perched on a shelf. In the foreground, two figures with white, textured heads are seen from behind. The figure on the left wears a red shirt with the number '33'. The figure on the right wears a blue shirt. A small white dog is between them. A black speaker is on the left wall.

Pay Heed, All Who Enter:
BEWARE OF "THE PHOG"

Pausing in front of the next door, Oscar asked Honey, "Now, are you ready to take a walk in the Cloud?" Honey thought that sounded very fun! "A data center is part of the 'Cloud'" Oliver explained, "as in cloud backup, cloud storage and cloud computing. All of that occurs right here. Once your data leaves your home, office or mobile phone, it often passes right through."

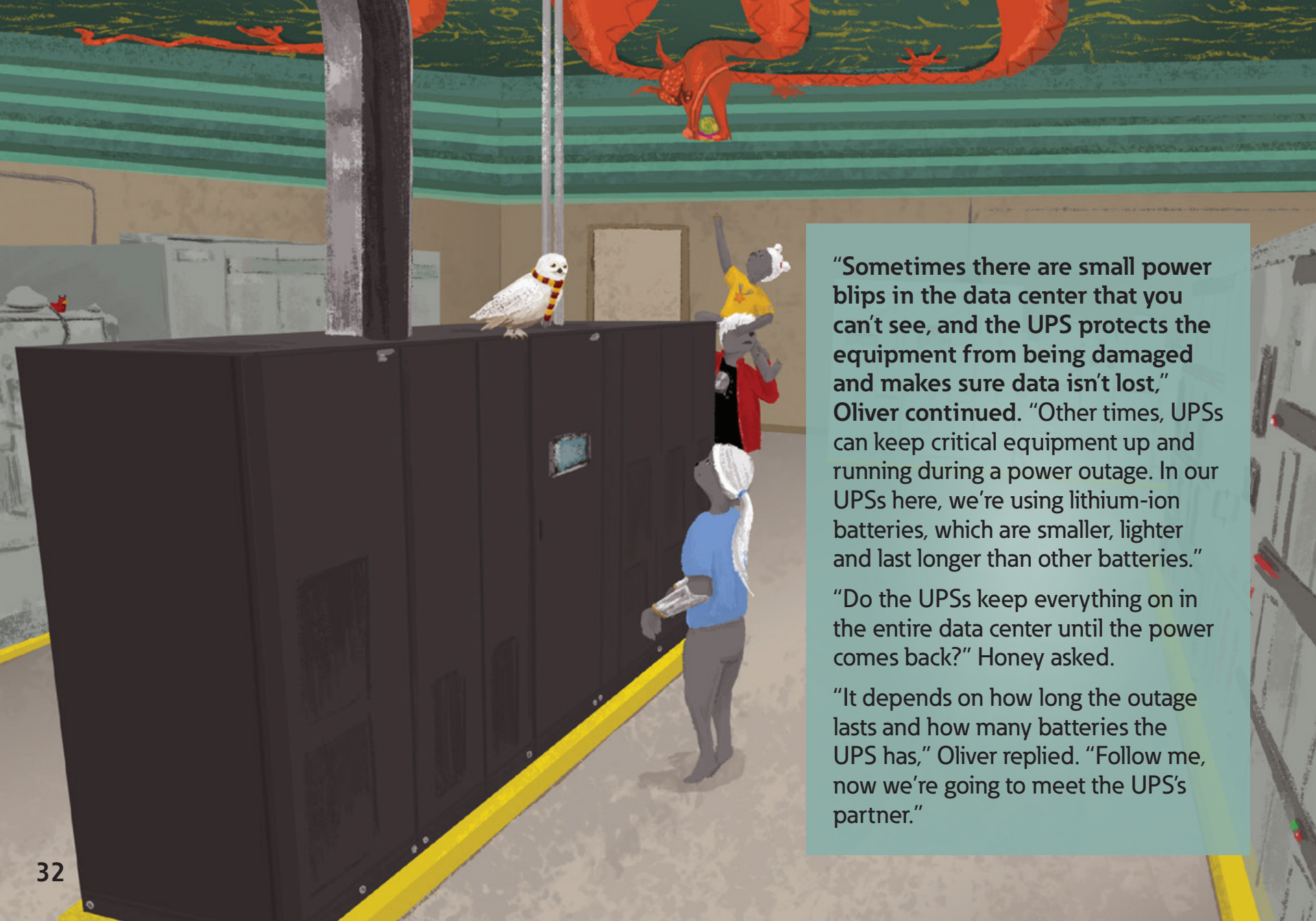
"So even though it sounds really mysterious, the Cloud is actually just a data hall with a bunch of racks?" Honey asked, clearly disappointed. "Pretty much!" Oliver acknowledged. "We only show this room to CEOs. And marketing people since they made up the Cloud. But get ready, because our next stop is one of the most important places in the entire data center."

“Do you know what happens if there’s a storm and the power goes out?” Oliver asked Honey as they entered another room. She did! “You have to use candles and my dad can’t watch sports on TV,” she answered.

“That’s true, if you’re at home!” Oliver said. “But in a data center, the consequences can be much worse—and also very expensive. That’s why we have a backup power source with lots of batteries called a UPS.”

Honey was confused. “You mean the big brown trucks that bring us stuff?” she asked. “Actually, in this instance, ‘UPS’ stands for uninterruptible power system, not the company that delivers packages,” Oliver explained.





“Sometimes there are small power blips in the data center that you can’t see, and the UPS protects the equipment from being damaged and makes sure data isn’t lost,” Oliver continued. “Other times, UPSs can keep critical equipment up and running during a power outage. In our UPSs here, we’re using lithium-ion batteries, which are smaller, lighter and last longer than other batteries.”

“Do the UPSs keep everything on in the entire data center until the power comes back?” Honey asked.

“It depends on how long the outage lasts and how many batteries the UPS has,” Oliver replied. “Follow me, now we’re going to meet the UPS’s partner.”

Oliver opened a door that led outside to a fenced area. "This is the generator yard," he told the family. "During long outages, these generators power the data center. But it takes them a little time to warm them up, so if the power goes out, the UPS takes over immediately then transfers over to the generators once they're up and running."



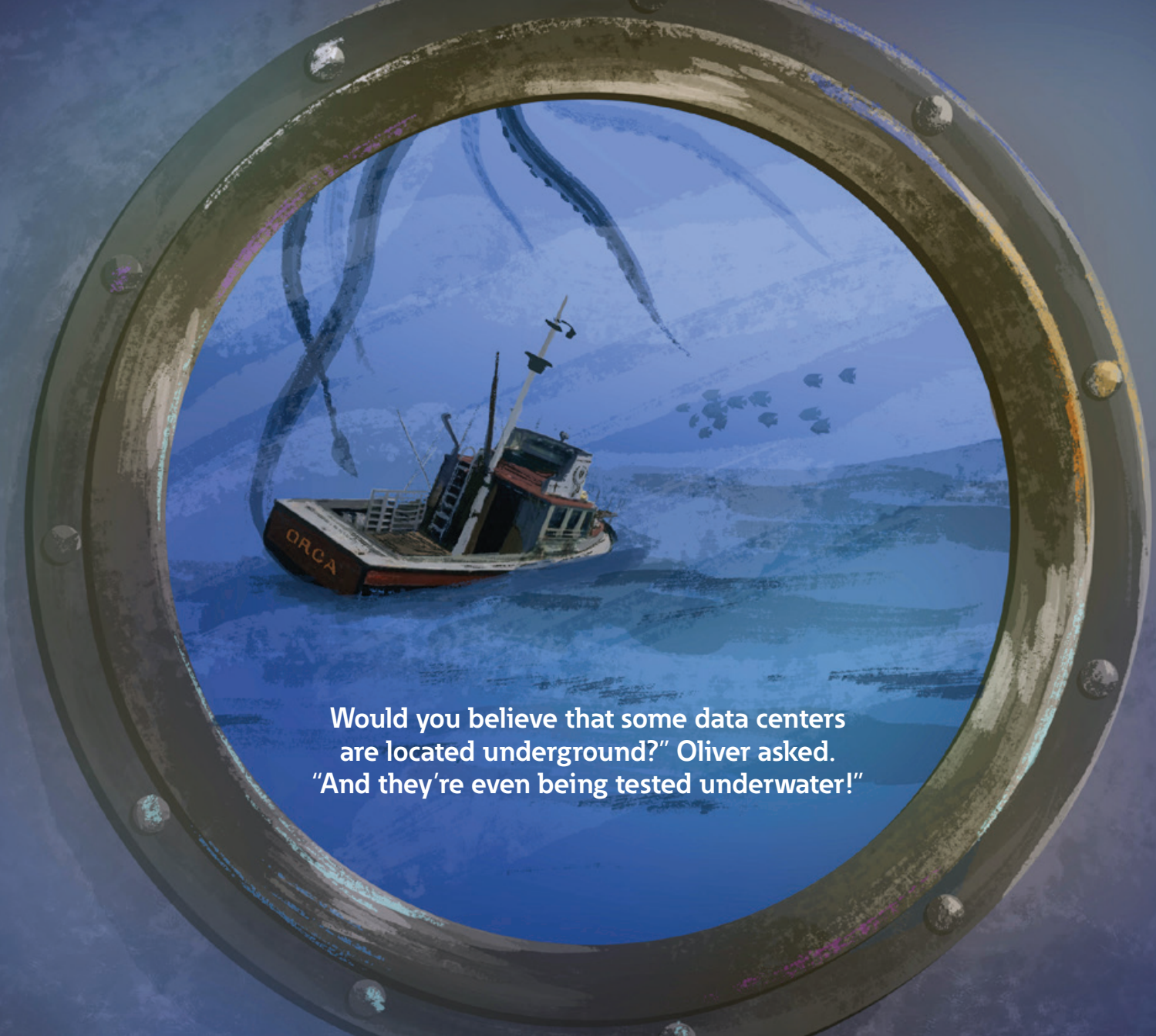


“So, what’s been your biggest surprise about the data center so far?” Oliver asked Honey. She thought for a moment. **“Probably how much equipment is in here!”** she said. **“Do data centers need a lot of energy to run it all?”**

“Yes, they do,” Oliver acknowledged, **“but many companies are working hard to lower their energy consumption and use sustainable energy sources. And in our data center, we’re even experimenting with hydrogen fuel cells to reduce our use of fossil fuels and have a more environmentally friendly facility.”**



“Are all data centers built near big cities?” Honey asked. “That’s another great question,” Oliver replied. “While historically they were, today many data centers are also being built in smaller cities closer to their end users. These are called edge data centers.”



Would you believe that some data centers are located underground?" Oliver asked. "And they're even being tested underwater!"

Oliver opened another door along the hallway then stepped back so everyone could look inside. "We're just going to peek into this room," he said. "It's reserved for data center employees and our clients when they need a break."

"What type of jobs do people have in data centers?" Honey asked.

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of
Armaments



Ryan

"There are many different roles," Oliver told her. "For instance, that's Ryan. He's the data center operations manager. As the leader of the facility, he's responsible for many important things, including supervising other workers and overseeing all systems and procedures."



Bobbeye

"As a data center engineer, Bobbeye is involved in designing, setting up and managing the information, networking and monitoring systems."



Mark

"Mark is a service technician, which means we rely on him to diagnose issues and repair equipment when it has problems. He also keeps the systems up-to-date."



Sam

"As a data center analyst, Sam researches new technologies to support the facility. He also creates plans and layouts for computer networks."



Tara

“Tara is a technical writer, so she takes really complicated information and makes it easier for people to understand. She creates materials such as manuals, how-to guides, journal articles and diagrams to show how something works.”



Rachel

“Rachel is a facilities specialist. Her job is to make sure various systems are operating correctly, such as heating and cooling, generators and UPSs.”



Chris

“Chris is one of our NOC technicians, so he’s responsible for continuously monitoring operations, the networks and the equipment to make sure no issues arise.”



Juan

“And that’s Juan, he’s in charge of security for the data center so he finds the best ways to reduce risk and protect the assets here—not only the people, networks and data, but even the company’s reputation,” Oliver explained. “Because if there’s a security breach, people can lose confidence in the organization.”



"Wow," Honey said. "I had no idea there were so many important jobs in a data center!" Oliver nodded. "It definitely takes a lot of people—and systems—working together to keep everything running smoothly," he said.

Honey suddenly realized they had made their way through the giant maze and were back in front of the mantrap. "That concludes our data center tour!" Oliver said. "Thank you for being our guests today. You'll exit right here."

**“That was the best day ever!” Honey told her parents as they drove home.
“When I grow up, I definitely want to work in a data center!”**



Word search puzzle

What is a data center?

Can you find all the hidden words?

Words can go up, down, left, right and diagonally.

BADGER
BRIGHTLAYER
CLOUD
DATACENTER
DCIM
DECIBELS
EATON

FIBER
FIREWALL
FROG
MANTRAP
MMR
NOC
PDU

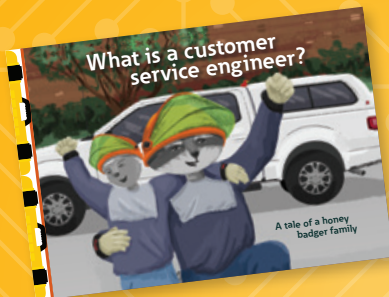
ROBLOX
SKYNET
STORMTROOPER
TENANT
UPS



HIDING WORDS
FROM MY
DATA CENTER
MANAGER IS
PART OF MY
EVIL PLAN!

R	F	A	R	C	F	I	B	E	R	Q	A	W	M	P
E	I	F	O	R	U	F	R	G	S	R	S	M	Z	D
P	R	S	B	T	M	W	I	L	V	K	R	B	K	U
O	E	Z	L	D	N	Q	G	O	C	I	Y	E	L	J
O	W	A	O	C	Y	T	H	A	Y	H	P	N	P	I
R	A	E	X	G	D	A	T	A	C	E	N	T	E	R
T	L	D	C	F	E	E	L	X	O	S	U	N	I	T
M	L	E	G	J	T	N	A	N	E	T	S	Q	C	K
R	M	C	E	L	P	A	Y	I	P	G	E	B	O	T
O	V	I	U	I	P	R	E	G	D	A	B	E	N	A
T	C	B	K	O	A	E	R	D	I	G	N	Y	P	D
S	X	E	A	T	O	N	B	N	L	K	I	P	T	U
U	Z	L	M	T	D	C	I	M	K	O	U	E	A	O
F	H	S	N	C	V	B	N	A	H	T	W	P	K	L
F	R	O	G	D	M	A	N	T	R	A	P	R	S	C

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