THE MAGIC OF DROPBOX, ITS VIRTUALITY AND MATERIALITY

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Box: Dropbox. Habitat: Dropbox lives only on computing devices. You can find Dropbox in the following habitats: on operating systems like Mac, Windows, and Linux; on mobile devices like iPhone/iPad, Android, Blackberry, and Kindle Fire; or in browsers like Firefox, Safari, and Chrome. One thing to note: no matter what habitat Dropbox lives in, it cannot live without Internet connection; Internet is the indispensable element that every habitat must have for Dropbox to work. Appearance: Dropbox’s branding icon is a squared cardboard box with the top open, suggesting that Dropbox is just like a cardboard box where you can ‘drop’ your readings, writings, photos, music, or other computer files, and then carry the whole box with you – virtually. Colour: Dropbox icons, despite their variations, always come with their ‘official colours’ strictly defined by the company. In most cases, for example when displayed on websites, on desktops, or on mobile devices, Dropbox icons are blue. This is officially called ‘Dropbox Blue’ (colour code #007ee5). In some other situations, you will find the icons displayed in ‘Cool Grey’, especially when there is insufficient displaying space. Size and shape: on the outside (the icon), Dropbox icons are squared images with sizes ranging from 16 x 16 pixels to 1024 x 1024 pixels, depending on the habitat. However, on the inside, Dropbox begins at 2-Gigabytes and can grow up to 500 Gigabytes (as of 2015), depending on how deep the owner’s pocket is. Unlike the other (physical) boxes discussed in this book, the in- and out-dimensions of the Dropboxes don’t match, and they even don’t correlate. In this aspect, Dropbox is like the TARDIS, Time And Relative Dimension In Space, the time machine and spaceship appearing in Doctor Who, which often stuns its visitors by being ‘bigger on the inside than it is on the outside’. This phenomenon is a direct result of the ‘virtuality’ of Dropbox, TARDIS, and the like. Behaviour:
Dropbox holds one’s digital files and makes the files accessible from multiple computing devices.

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*When Hermione Granger pulled out a pair of jeans, a sweatshirt, and the silvery Invisible Cloak from her small, purple, beaded handbag, not only Ron Weasley and Harry Potter, but, I believe, all the readers and viewers were astonished by how such a small bag could hold items that were in total bigger than itself.*

This is a typical scene that represents *magic,* which doesn’t only appear in the *Harry Potter* books and movie series, but also in fairy tales like *Mary Poppins* (her purse is tiny, but appears to hold a huge quantity of items like clothes and lamps) in *Doctor Who* (the time machine and spaceship TARDIS is bigger on the inside than it is on the outside), and in other genres of creation. The scene works as magical since it conflicts with our physical common sense of how objects should behave – a container’s outer dimensions should correspond with its inner dimensions, and thus it should be incapable of holding items bigger than itself. In other words, such scenes represent magic because they conflict with what we think we know about *materiality.*

Even though in real life scientists haven’t gone that far and really found a way to produce Hermione’s handbag or any other kind of container that can hold items bigger than itself, today we already have something closer to this goal. Thanks to the rapid development of computer hardware over the last five decades, our hand-sized mobile phones can now hold thousands of photos on them. And even a 5-cm-long USB stick can hold more or less the same quantity of photos, documents, music, and other types of digital files. This is also magical, considering that such a quantity of files, if they were not digital, not virtual, would take quite a big *physical* space to store. The trick here is the form of digital files – composed of 0s and 1s, represented by electronic pulses, magnetic transitions or other forms of energy, and stored in corresponding physical media. Such ways of storing information provide a high conversion
ratio between amount of information and space for storage, meaning we are able to store huge amounts of digital/virtual information in physically small devices – boxes for digital files.

Despite the fact that digital files are virtual, they must still reside in some physical boxes – CDs, USB sticks, hard drives, or mobile phones. The compact storage these boxes offer is probably against common sense and seems magical, but it has a physical limit – by destroying the hosting medium, one can destroy a huge quantity of files for eternity. On the other hand, Dropbox, a special box for storing digital files, overturns this fundamental limitation of digital boxes by providing cloud storage and thus introducing a new level of virtuality of digital files which is not limited by physical devices. Although Dropbox is not the only and was not the first cloud service in the world, it is indeed the pioneer which brought this idea to the general public and let people embrace it – without even being aware of the technology behind it.

WHAT IS DROPBOX AND HOW DOES IT WORK?

Ever since Dropbox was officially launched in 2008, it has gained wide popularity for providing a safe and easy-to-use solution to store and transfer one’s digital files on and via the Internet. At the period of its development computers were already popular in workspaces and at home, and many people had long been comfortable with working, reading, writing, and entertaining on computers. Great quantities of digital documents and files were created by non-professional computer users every day. Naturally, people also needed to move files from one computer to another, to bring home work, to share files with their colleagues, friends, and families, and to back up files to keep precious files safe.

One way of transferring digital files is to put them into a storage device and carry the device around. However, carrying devices around isn’t always desirable or easy to do, due to the increasing size of files and the potentially long physical distance of transfer. Faced with these limitations, people began thinking about transferring files virtually – over the Internet. Although cloud storage hadn’t been proposed at that time – there was no Google Docs, no Microsoft SkyDrive, and of course no Dropbox – there had been solutions to the problem of how to transfer files virtually. File Transfer Protocol (FTP) allowed people to transfer...
files between a local computer and a remote FTP server and was very popular for backing up and sharing files. But it required the user to have the knowledge and ability to set up such a solution and to have access to such a server. *Source Control Systems* were popular already at that time among programmers for having a remote secure backup for their work-in-progress codes with revision history – a feature that kept track of the modification history for each file and allowed the user to go back in time to a certain version. *Box*, a secure backup service which also adopted the 'box' as its iconography, already provided businesses with a secure way to back up files from office computers on remote servers. Despite all these technologies, when Dropbox hit the stage of TechCrunch, it was a revelation to the market. Why did Dropbox stand out from all the other similar solutions?

To understand this, let's look at the image that Dropbox conveys to the public. It is mainly done with the brand name itself and the simple Dropbox icon, as shown at the beginning of this article. The icon is simply a blue cardboard box, symbolising a personal container for holding one's digital files (emphasised by the colour blue) that can be carried by the owner of the box. One can simply 'drop' documents, photos, and memories into this box, and start carrying it around. In this way, Dropbox conveys the concepts of easy storage and transferring files at the same time.

Dropbox works like this: you first apply for an account to acquire a 'persona' Dropbox – a virtual box that resides on your computers and mobile phones – and then you have the ability to drop files into it. You can use a browser to access your personal box and begin to put files into it by uploading files. In this case, your personal box is on Dropbox's website. If you are on a desktop with Windows, MacOS, or Linux operating systems, Dropbox can create a 'local materiality', a local copy, of your personal box on your desktop for you, by automatically downloading all the files in your personal box to your local computer. In this case, you can drag and drop files from your computer to your local box easily. And when you do so, Dropbox automatically transfers the new or updated files to your remote personal box, the 'real' box. The next time you check your personal box through a web browser from any computer, your personal box is up to date with all the latest changes. You can even open the files in your local box to read or to work on while they are still in the box.
Now, how do you carry your Dropbox around, along with all the files you’ve dropped there? For example, when you want to take your work documents home from the office? Here is the first amazing thing about this box: you do not really need to carry your Dropbox with you at all. If this were necessary, then Dropbox would be no different to a USB drive, where you also dump all the files you want to carry, but really do have to carry the USB drive. How does this box work, then? Why does it not need to be carried?

The reason is that your Dropbox has many entrances (access points), but these are just portals that lead you to the same remote place – your personal box, the ‘real’ one, no matter where it is physically. You can deploy as many portals on as many computers or mobile devices as you want. For example, you can create a new portal at any time on any device by opening a browser to access your personal Dropbox, even from a computer that you have never used before. With these many portals, you can drop files to your personal Dropbox through your office computer, leave the office, go home, and acquire the same files through your home computer. You can even open your Dropbox from your mobile phone and read a previously uploaded ebook on your way home. As long as a device is connected to the Internet, you can access all the files in your personal box from almost everywhere, without really carrying them around.

With Dropbox, you don’t need to carry anything, because your box is virtual, because it’s already everywhere.

So, the Dropbox icon is simply a portal, a symbolic entrance to your personal box. There is in fact no ‘real’ box right behind the icon. The materiality of your personal box is somewhere else – not on your local desktop or mobile phone, even though you have an exact copy of your Dropbox files there; it is not even on Dropbox’s website, even though you can access all your files from there. This is also why Dropbox is bigger on the inside than it is on the outside: the icons, representing the entrances, are just portals; they are never the ‘real’ box. In other words, the linkages between the entrances and the real box are also virtual. So, where is the ‘real’ box? What is the physical existence, the materiality of your personal box?

Before we get into that, let’s first explore the physical existence, the materiality, of any digital file.
RETHINKING THE VIRTUALITY OF DIGITAL FILES, AND OF DROPBOX

We tend to think that digital files are virtual. We are told that they are composed of binary digits – 0s and 1s – but most of us never really see the 0s and 1s when staring at our computers. It feels like the 0s and 1s are just metaphors and they don’t exist in the physical world. But this is incorrect. Digital files really are composed of 0s and 1s in the form of electronic pulses, magnetic transitions, or other transitions, and the digits always need to be materialised on physical mediums like CDs, hard drives, and USB drives, depending on which type of physical energy is used for the storage device. In other words, digital files always need to reside on physical mediums in order to exist. This implies that when one destroys the physical media where a group of digital files reside, one also destroys those digital files. After all, digital files are never virtual. They always need to reside on some physical material, and, from that perspective, are in fact very real.

Dropbox is no exception to this rule, in that every personal Dropbox and the files inside must reside on some physical device. But where is the physical existence of one’s personal Dropbox located, if not on one’s desktop, mobile phone, nor on Dropbox’s website, since all of these are all just portals and local copies? In fact, probably no one can say where the physical existence of your personal Dropbox is located, not even the Dropbox engineers, since they don’t know exactly where your files are stored at this very moment. The thing is, your real box might be divided into many pieces, and each of them is stored in a different physical device. Also, your box and each of its pieces may be stored many times in different physical devices – this is called ‘redundancy’ – and the devices are likely to be in different locations – ‘distribution’. Redundancy and distribution are supposed to make sure your files are always available, accessible, safe, and secure, even when one physical copy is temporarily down or damaged due to hardware or network failure. Now you understand that all the above makes tracking the physical existence of your personal Dropbox complicated.

The technology behind the above-mentioned mechanism is called ‘cloud storage’, which Dropbox adopts for storing its enormous quantity of precious user files. By adopting cloud storage, users’ files are always available, accessible,
safe, and secure within Dropbox. As Dropbox users, as long as we can always access our personal boxes, we don’t really need to know on which physical devices our files are based.

By using cloud storage, Dropbox is able to create a virtual personal box where you can store and transfer your files without carrying any physical devices. By using cloud storage, Dropbox successfully hides the materiality of boxes and becomes purely virtual – one doesn’t even know where the physical body of one’s box is, and it doesn’t matter. Cloudiness is the key to the Dropbox concept: one can simply drop files through one portal, and retrieve the files from another, without carrying any physical devices in between. The portals and the real box are detached, and the real box can be anywhere.

Cloudiness also sets Dropbox apart from other services that store and transfer files virtually through the Internet. For FTP and Source Control Systems, one still has to set up a physically existent server. Then, the issue appears: what if the server breaks down? The materiality of such solutions would then be destroyed, and so would the digital files on the servers. By adopting cloud storage, Dropbox avoids this materiality issue, since cloud storage is designed to guarantee secure and reliable file access by creating multiple copies of each file and storing files on different physical devices in different locations to prevent any kind of access failure.

THE MATERIALITY BEHIND THE CLOUD: DATA CENTRES

‘Then, the cloud must have materiality. What is it like?’, you might ask next. Indeed, no digital file can escape the law of physics, and it must reside on some physical device. So does the Cloud.

These days, software companies that own masses of customer data don’t manage the storage on their own anymore. They seek help from ‘hosting companies’ like Amazon and Google, which provide cloud storage and guarantee availability and accessibility of files at any time in easy-to-manage ways. The idea is that cloud storage provides one big logical store for companies like Dropbox to keep their management simple, while the physical reality is that the data are distributed in many storage devices spread across different geographical locations. The benefit is that cloud stores are highly fault tolerant – meaning the service
won’t go down even when there are hardware or network failures, and they are also highly durable through redundancy and the duplication of the data stored on them. These distributed and redundant yet almost unimaginably numerous user data are stored in the many data centres built by those hosting companies.

What does a data centre look like? **FIGURE 24.2** shows us a normal setting for data centres. They are huge matrices of tens of thousands of computers; computers put on compact racks and connected to each other with wires. Computers there are reduced to only the machinery for computation and storage – unnecessary peripherals like monitors, mouse, and keyboards are all removed. The idea is to make thousands of machines act as one – logically. Data centres need an effective and low-cost power supply in order to keep the tens of thousands of computers running. They also need efficient cooling systems in order to reduce the significant amount of heat produced by those machines every minute. Hardware – hard drives, cables, etc. – in data centres are exhausted quickly, since the whole data centre is constantly running and responding to requests for file access, and thus the hardware needs to be changed frequently in order to keep the cloud storage service reliable.

Data centres are often located in isolated locations in big standalone warehouses and are hidden away from people. They require high-standard security
to keep their hardware and service secure from man-made damage. Thus, data centres are often mysterious. Luckily, Google is generous enough to show us its data centres on its website,10 where we can also see the interior of one of its data centres – how the machines are placed together and connected, how the cooling systems (normally great quantities of water) are designed, and how much the data centres are like big boxes of machines that keep people out.

**THE COST OF VIRTUAL MATERIALITY**

Cloud storage and data centres contribute to the most important part of Dropbox’s magical virtuality, making Dropbox seem purely virtual without revealing the materiality behind it, which sets Dropbox apart from its competitors. But one must not forget that the easy-to-grasp concept of Dropbox, conveyed by its brand name and icon, is the key to its success, since it makes digital file transfer such an easy task that even school pupils have no difficulties understanding and using it.

Then again, cloudiness and the hidden materiality behind that virtuality produce their own costs. Data centres are designed to provide reliable and secure services, and thus they need to be built in safe places unsusceptible to natural disasters. These places are also highly secured sites, similar to military areas. Data centres consume a lot of energy, and thus they need to be built in regions or countries where energy supply is sufficient and electricity costs are low. Running a data centre is a very high-tech business that requires huge investments in technology, hardware, and facilities. The cost behind data centres, cloud storage, and services that rely on cloud storage, is very high. Being aware of these costs might trouble the picture of the ‘magic’ simplicity that Dropbox constantly evokes. But for us as users, it is crucial to open the ‘blue box’ and take a careful look into it.

**NOTES**

1 This article is not affiliated with or otherwise sponsored by Dropbox, Inc.
4 Doctor Who is a British science fiction television series and is the longest-running Sci-Fi TV series ever screened on earth.

5 Hermione Granger, Ron Weasley, and Harry Potter are the three main characters in the children’s fiction series ‘Harry Potter’, a story written by British author J. K. Rowling about a fantasy world of wizards. In the story, Miss Granger is known for her smartness. The story was adapted into a movie series.

6 ‘Mary Poppins’ is a series of children’s books by Pamela L. Travers and was adapted into film in 1964. The story is about a magical nanny who visits dysfunctional families and improves their lives by using magic and other means to take care of their children.

7 TechCrunch is an annual conference where technology startups launch their products and services in front of media and potential investors.

8 According to an analysis done by 99designs based on over 1,000 tech company logos, blue is the most chosen staple colour. The design company explains the reason: ‘In a fast-changing industry with many new players, reliability is key.’ See 99designs, ‘The Logo Colors of Technology’, [accessed 1 November 2018].

9 Note that Dropbox doesn’t build its own cloud storage for users’ files. On the contrary, it rents Amazon’s S3 (Simple Storage Service), a cloud storage service launched in 2006, for storing its mass amount of user files.


REFERENCES


