CHAPTER 3

Shifting Toward the Commons: Microsoft and Competing Models of Software Production

The Microsoft Corporation ('Microsoft' hereafter) offers perhaps the most contentious relationship with the open source community. Primarily, this is due to Microsoft's core business model, which relies on the sale of proprietary software. Through strategic partnerships, strong intellectual property protections, and a robust strategy for capturing the consumer market for personal computer (PC) sales, Microsoft grew to become one of the largest software companies in the world. At its peak, Microsoft enjoyed nearly 97% of the market share of all computing devices in the year 2000 (Tu, 2012). This was before the company was found to be in violation of the Sherman Antitrust Act by the U.S. Department of Justice (DOJ). However, the antitrust decision did little to curb Microsoft's economic growth at the turn of the twenty-first century. Rather, the company's profits continued to grow, and Microsoft still ranks as one of the largest and most dominant software companies in the world. What has changed, particularly after the antitrust ruling, is the company's relationship to the broader free and open source software community.

As mentioned in the introduction to this book, Microsoft's former Chief Executive Officer, Steve Ballmer, referred to Linux – the open source operating system – as 'a cancer' in 2001. Slightly more than eleven years later, the company opened an entire division devoted to the promotion and development of open source software. In this chapter, the history of Microsoft's chequered relationship with free and open source software (FLOSS) is charted, focusing on three specific moments that illustrate this relationship. First, the company's initial growth and its rise as one of the most dominant software companies in the world is described. During this time, the company took an adversarial approach to open source software. This includes Bill Gates' 'Open Letter to Hobbyists' in

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which he decried the widespread culture of freely sharing software in the hobbyist community, as well as the leak of internal documents known as 'The Halloween Documents' in 1998, which clearly outline the company's views on open source software. The second section discusses the U.S. Department of Justice's investigation and, ultimately, its conviction of Microsoft for violating the Sherman Antitrust Act. Findings from the investigation and the subsequent decrees issued to the company in the wake of the conviction are provided. The final section focuses on the most recent history of Microsoft, including its Shared Source program as well as its decision to create Microsoft Open Technologies, a wholly owned subsidiary dedicated solely to promoting and developing open source software, open standards, and open technologies.

The Microsoft case study exemplifies the clash between capital and the commons in a couple of ways. First, Microsoft's relationship with the FLOSS community is indicative of the ways in which the *processes* involved in FLOSS production transformed from a seemingly antithetical means of commercial software production into an accepted form of industrial software production. Indeed, as was discussed in the Introduction and will be seen in subsequent chapters, open source software products and processes now pervade commercial software production.

Second, the other tension between capital and the commons at the heart of the Microsoft case study can be seen in the company's stance toward intellectual property and industrial software production. On the one hand, Microsoft relies upon strong intellectual property protections to exclude others from making use of its products. Those products have been produced in-house as part of Microsoft's core business model. Microsoft uses these intellectual property rights not only to protect its own works, but to threaten FLOSS projects with infringement lawsuits. It is within this context that we can view Microsoft's long history of railing against the lack of intellectual property within the FLOSS community, beginning with Bill Gates' 'Open Letter to Hobbyists' in 1976, through to Steve Ballmer's 'Linux is a cancer' claim. What changed after the DOJ antitrust ruling is that Microsoft shifted its position toward FLOSS projects in general by submitting its own licences for approval by the Open Source Initiative (OSI). The shift in Microsoft's stance toward FLOSS after the antitrust ruling represents an important moment for Microsoft, specifically, but also for the software industry in general. The shift can be understood as a humble admission that the business model upon which Microsoft relied for most of its history had been mostly usurped by a more efficient and effective model of software production – mainly, the commons-based peer production used by FLOSS developers. But it can also be understood within the broader context of the dot-com bubble burst that hit the economy at the end of the twentieth century, which coincided with many Internet-related companies' failures but also the emergence of the Web 2.0 phenomenon. It was during this time after the DOJ ruling that Microsoft not only readjusted its positioning with respect to FLOSS projects, but also attempted to become more directly involved in FLOSS

projects. The company's reasons for doing so were primarily to comply with the consent decrees to which the company agreed as part of the antitrust ruling, but also because the commons-based peer production of FLOSS had proven to be a viable and effective model of software development.

As such, capital readjusted its relationship with the emergent practice of digital commons production and sought ways to harness that production for its own gains. Two bodies of theory can be used to understand Microsoft's shift toward the commons. On the one hand, the emergent craft of FLOSS production proved to be an effective and attractive model of software development, which directly contradicted the Microsoft claims that good software development was only possible with strong intellectual property rights. In other words, the labour process involved in the production of software shifted with the growth of the smaller craft community of FLOSS development. This more generalised labour process led to a massive increase in the numbers of people working on FLOSS projects. The production taking place in that community proved capable of providing a model for industrial software production. Indeed, the processes of FLOSS production outpaced Microsoft's in-house development specifically because production was open to others. On the other hand, however, this placed pressure on labour in a couple of ways. First, FLOSS production was not subject to the same limitations as corporate software production, namely the number of working hours in a day, the number of employees working on the software, etc. This was very good for the efficiency of software production. Second, however, this feature of FLOSS production also placed downward pressure on the value of labour within the software industry.

In other words, this could be described as a mix of extracting greater degrees of absolute surplus value (i.e. extending the working day) as well as relative surplus value (i.e. technological change that decreases the value of labour). The *process* here was actually a way of extracting surplus value from software production by effectively outsourcing software production to unwaged labour. The incorporation of this labour process into industrial software production also ushered in a shift in business strategies within the software and technology industries. Instead of paying workers directly for the development of software, corporations opt to invest in technologies or platforms (i.e. fixed capital) that support open source software production. This also explains some of Microsoft's more recent ventures and acquisitions, which will be discussed toward the end of this chapter.

This chapter is structured in a way that illustrates these broader points. As such, the goal of the chapter is twofold: first, to argue that the antitrust conviction in 2001 marks a critical moment in Microsoft's history that, when paired with the bursting of the dot-com bubble and the emergence of the so-called Web 2.0 phenomenon, caused a shift in Microsoft's business strategy whereby the company tried to find ways of harnessing the power of commons-based peer production or, in other words, the labour *process* of FLOSS production. Second, it demonstrates Microsoft's own contradictory history in its stance

against the open sharing of ideas. In fact, many of Microsoft's most successful products have incorporated or licensed design features that were developed by others. By making these two points, the chapter shows how Microsoft's relationship with the FLOSS community can be understood as a strategic readjustment that was undertaken in response to Microsoft's declining market share while Linux-based systems were gaining market share. Although not a complete transformation of its initial stance, Microsoft's shift in its relationship to the broader FLOSS community can be described as moving from capital toward the commons.

3.1. The Rise of Microsoft 1975–1990

Microsoft was founded in 1975 after Paul Allen and Bill Gates developed the Altair BASIC interpreter. An interpreter is a computer program that directly performs functions written in a programming language. In the case of Altair BASIC, the interpreter was designed to execute functions written in the BASIC (Beginner's Allpurpose Symbolic Instruction Code) programming language so that they could be performed on the Micro Instrumentation and Telemetry Systems (MITS) Altair 8800 microcomputer. Altair BASIC became Microsoft's first product, which was distributed by MITS under contract with the newly created company. From its very beginnings, Microsoft focused on providing software solutions that could be included on hardware devices. Microsoft's business model relied on establishing contracts with hardware providers, which would allow Microsoft products to be included on hardware.

However, the company has consistently exhibited an antagonistic position toward alleged infringements on its intellectual property. The first example of such behaviour came from unauthorised copying of its original Altair BASIC interpreter. The Altair 8800 microcomputer has been credited as the device that ushered in the microcomputer revolution (Garland, 1977). It became widely popular after being featured on the cover of the January 1975 edition of Popular Electronics. From the magazine, readers could order kits for the computer, which could then be assembled by hobbyists interested in experimenting with the device. As part of the order, readers could purchase the Altair BASIC language for a fixed price. Since the Altair BASIC language could be included with orders for the Altair 8800, Altair BASIC also became widely used. However, hobbyists often made copies for friends or others to allow them to experiment with the device as well. This made Altair BASIC subject to unauthorised copying, which prompted Bill Gates to publish an 'Open Letter to Hobbyists' on 3 February 1976.[12]

In the letter, Gates noted that 'hundreds of people who are … using BASIC' have all provided positive feedback about the interpreter. However, he claims that 'most of these 'users' never bought BASIC,' as 'less than 10% of all Altair owners have bought BASIC,' and the 'amount of royalties [Gates and Allen]

have received from sales to hobbyists makes the time spent of [sic] Altair BASIC worth less than $2 per hour' (Gates, 1976: 2). Gates continued by decrying the fact that most hobbyists steal software, and asked whether this is a fair practice because it ultimately prevents good software from being written. In effect, Gates was arguing that the time, labour, and resources spent on developing software ought to be returned to him in the form of fair payment for use of the software.

Gates' open letter signalled what would become a recurring theme throughout Microsoft's history: mainly, a contentious relationship with hobbyist communities of programmers, which Gates and Microsoft viewed as infringing on intellectual property rights. The open sharing and collaboration among the hobbyist community represented a threat to Microsoft's business model, which was founded on the need to protect its products by using strong intellectual property protections. Indeed, some of the responses to Gates' open letter focused more on the business strategy, especially the shortcomings of Microsoft's contractual negotiations with the hardware vendor (Hayes, 1976). However, Gates' letter is also historically significant because it was an early document in which some of the tensions between capital and the commons were spelled out. Specifically, it highlighted tensions around labour, ownership, intellectual property, and the commercialisation of software (Driscoll, 2015). In the years that followed the Altair BASIC beginnings, Microsoft pursued a course of action that sought to do exactly that. By ingratiating itself with large hardware manufacturers, Microsoft rapidly gained market share and became one of the most dominant software companies in the world.

3.1.1. MS-DOS

Microsoft's business strategy during its early years focused primarily on providing BASIC interpreters, but the company shifted its focus to operating systems in the early 1980s. From the 1980s until the mid-1990s, Microsoft relied on the Microsoft Disk Operating System, or MS-DOS, as its core commodity. MS-DOS originated in 1981 after IBM put out a request for an operating system to use on its IBM-PC line of personal computers (PC). Shortly after the initial request from IBM, Microsoft acquired the rights to 86-DOS, an operating system from Seattle Computer Products, which it renamed MS-DOS.[13] Microsoft customised the newly acquired operating system to the specifications required by IBM. In turn, Microsoft licensed use of the operating system to IBM, which IBM then included on its IBM PCs under the name PC-DOS.

Microsoft's contract with IBM was not without controversy, however. The rise of the PC was made possible by advances in integrated circuit, or microchip, technology. Microchips for the consumer market were first used commercially in calculators, which were manufactured by companies like Hewlett–Packard and Texas Instruments. As demand for higher performance calculators increased, Intel was commissioned by Busicom, a Japanese firm, to produce

the first commercially available microprocessor that could receive digital data and process it according to its programmed functions. The new microprocessor was called the Intel 4004 (Nairn, 2002). However, these new chips still needed language capable of converting instructions into signals that the chip could process. This operating system came from Gary Kildall, who authored a language capable of performing such functions. Eventually, Kildall's language was transformed into the first operating system for personal computers, known as CP/M. The rights to CP/M were held by Kildall's company, Digital Research, Inc., or DRI.

Throughout the late 1970s, CP/M became the industry leader in operating systems for personal computers. When IBM announced its initial line of personal computers, the company chose Intel as the provider for microprocessors, but it also needed a supplier for the operating system. Both Microsoft and DRI were consulted about providing an operating system. The exact details about what transpired during the negotiations are a bit murky,[14] but we know that Microsoft eventually won the contract, which resulted in the acquisition of 86-DOS that was subsequently rebranded as MS-DOS. Kildall, however, would claim that MS-DOS infringed on his copyright for CP/M. Kildall confronted both Gates at Microsoft and IBM about the alleged infringement but, on advice from lawyers, decided not to sue. Instead, Kildall chose to licence CP/M to IBM for inclusion on their personal computers. When the IBM PCs were eventually released, IBM offered a choice of operating system: $240 for CP/M or $40 for DOS (Hamm and Greene, 2004). The upshot of the dramatic price difference was that Microsoft became the clear choice for consumers, and DRI was eventually purchased by Novell in 1991.

Microsoft's contract with IBM was perhaps the biggest turning point on its path to becoming the largest software company in the world. As part of Microsoft's contract, it reserved the right to sell its operating system to third-party vendors as well, which allowed the company to exploit sales of its operating system to any hardware manufacturer. Employing this strategy, Microsoft grew tremendously from 1981–1995, with an increase in annual revenues from $16 million in 1981 to more than $6 billion in 1995 (Campbell-Kelly, 2001). Although exact figures are not publicly available, some estimates suggest that MS-DOS held nearly a 90% share of the PC market (Gilbert, 1995). Although MS-DOS would continue to be produced until September 2000, Microsoft began focusing its efforts on developing an operating system with a graphical user interface (GUI). The product that it ultimately developed, Microsoft Windows, would continue Microsoft's dominance of the personal computer software industry.

3.1.2. Microsoft Windows

Operating systems featuring a GUI did not start with Microsoft. Researchers working at Xerox's Palo Alto Research Center (PARC) first developed the GUI,

which was used on the Xerox Alto computer in 1973. However, Xerox did not successfully exploit the GUI commercially. Since the market for personal computers and operating systems was already dominated by IBM and Microsoft, Xerox found it difficult to focus its efforts on commercially exploiting the GUI. Consequently, Xerox invited Steve Jobs and other representatives from Apple to its PARC for access to its prototypes in exchange for a $1 million investment in Apple prior to its initial public offering (Ward, 2013). During this visit, Jobs viewed prototypes of a computer mouse used for navigation as well as the ability to move text around on the screen. From this meeting, Jobs is said to have refocused efforts at Apple toward developing a GUI operating system. However, others have argued that assigning too much causality to Jobs' single visit is an erroneous assumption, as other Apple engineers had ties to the PARC and Jobs himself made more than one visit (Pang and Marinaccio, 2000). Whatever the inspiration, Apple worked on developing a GUI operating system for its Macintosh personal computers. However, Apple was still behind IBM and Microsoft in developing applications for its operating system.

Microsoft had established itself as a leader in the market for operating systems for PCs, and had previously worked with Apple by producing the SoftCard, a microprocessor designed to run programs designed for CP/M on the Apple II computer. As a result, Microsoft negotiated a licensing agreement for access to the Mac operating system in 1985. At this point, Microsoft was already working on Microsoft Windows, its GUI operating system, which was announced in 1983. The purpose of the licence with Apple was to allow Microsoft access to certain visual elements of the Mac operating system so Microsoft could develop applications for the Macintosh (The History of Computing Project, 2014). To ensure that such a licence was granted, Microsoft used its powerful position in the PC software market by threatening to 'cease development work on important Mac applications unless such a license was granted' (Nairn, 2002: 375). Perhaps not coincidentally, Windows version 1.0 was released in 1985, the same year that the licence was granted.

Both Microsoft and Apple then worked on GUI-based operating systems to provide easy-to-use solutions for consumers. Although neither the first Microsoft Windows release nor the Macintosh computer proved to be commercially successful, GUI-based operating systems soon allowed massive diffusion of PCs to the consumer market. Microsoft held its IPO in 1986, which earned $61 million, which the company used to invest heavily in developing its Microsoft Windows operating system. Microsoft emerged as the clear winner during this period, and the company's relationship with IBM ensured that its operating system would be installed on IBM-compatible computers. Microsoft's growth during this period was immense, as evidenced by its growth in market share to 90% by some estimates (Gilbert, 1995). This growth in market share coincided with an increase in revenues, and the Windows operating system with its GUI was the key product that fuelled the growth. However, Apple challenged Microsoft's claims to the GUI elements of Windows, claiming that Microsoft had infringed

its intellectual property. This ultimately led to a copyright infringement lawsuit between the two companies.

3.1.3. Apple Computer, Inc. vs. Microsoft Corporation

In 1988, Apple began a copyright infringement lawsuit against Microsoft. Apple claimed that Microsoft had infringed on 189 elements of its GUI, which, when taken together, constituted a 'look and feel' of its Macintosh operating system that was protected by copyright. Apple claimed that the infringements occurred in version 2.03 and, later, 3.0 of Microsoft Windows. The lawsuit stemmed from the initial licencing agreement that was negotiated between Apple and Microsoft when Apple granted Microsoft access to its GUI for developing applications for the Mac. The resulting litigation lasted four years, but the case was interrupted by Xerox bringing a suit against Apple, whereby Xerox claimed Apple had violated its copyrights by using some of the GUI elements originally featured in its PARC operations. Xerox further claimed that Apple was guilty of unfair business practices because of its copyright claims on the GUI, which made it difficult for Xerox to license the technology to other customers. The case against Apple grew out of the meetings held between Xerox and Apple when Steve Jobs and other Apple representatives visited the Xerox PARC to see prototypes of the GUI in exchange for Xerox's ability to acquire stock prior to Apple's IPO.

Xerox's claims against Apple were ultimately dismissed, as Apple claimed that, while it may have borrowed ideas from Xerox's PARC, those ideas were not able to be protected by copyright, and Xerox ought to settle any remaining dispute with the Copyright Office (Pollack, 1990). Similarly, Apple's case against Microsoft was rejected. Of the 189 claims of copyright infringement, all but ten were dismissed. In the end, the District Court ruled in favour of Microsoft, claiming that the remaining ten claims were over *ideas* rather than *expressions* that could be protected by copyright. Furthermore, the original licensing agreement signed between Microsoft and Apple granted Microsoft the 'right to transfer individual elements or design features using its "Windows" program' (Apple Computer, Inc. v. Microsoft Corporation, 1994).

While the details of this 1994 case may not seem directly related to corporate involvement in FLOSS, it does illustrate several things about software development, intellectual property, and Microsoft. First, the case demonstrates that early software development, particularly of those features that we may take for granted today like the GUI, was not the result of rugged individuals developing the technology alone – Richard Barbrook and Andy Cameron (1995) developed a similar critique in *The Californian Ideology*. Rather, technological development is a collective and collaborative process in which the ideas of others can influence the direction of development.

Second, the case is instructive for the exploitation of intellectual property, specifically because it illustrates how original authorship can be separated from

ownership (Bettig, 1992). While the idea and design for the GUI may have originated in Xerox's PARC, Xerox had not commercially exploited its designs. Through a series of licensing agreements – first between Apple and Xerox, and later, between Apple and Microsoft – the rights to the individual elements of the GUI became diffused as they were shared among peers. Microsoft was already in a strong market position to exploit the GUI through its Microsoft Windows operating system, whereas Apple relied on assistance from Microsoft for developing applications for its emerging Macintosh computer. By doing so, however, Apple gave access to its GUI operating system to Microsoft. In turn, Microsoft honoured the stipulations of its original licensing agreement with Apple, but it would later continue development of its Windows operating system by using some of the same elements that Apple had been using. Furthermore, Microsoft's alliance with major technology manufacturers ensured that its operating system would be rapidly adopted, which further solidified its market power during the 1990s.

Third, there is a great contradiction at the heart of this case when compared with the history of Microsoft. Although the company benefited from sharing ideas to develop its Windows operating system, the company relied heavily on strong intellectual property protections to exclude others from its software as it ruthlessly defended its position atop the software industry throughout the 1990s. As we will see, however, this ruthlessness is ultimately what led to investigations for antitrust violations.

3.2. Microsoft in the 1990s

Microsoft's partnership with IBM was what ultimately allowed the company to solidify its strategic position at the apex of the computer software industry. Sales of the IBM PC and its clones reached nearly 16 million by 1990, which represented nearly 84% of the market share for personal computers (Reimer, 2005). Originally, Microsoft teamed with IBM to produce the OS/2 operating system, which IBM intended to include on its PCs, but Microsoft was busy working on its Windows operating system. When Windows 3.0 was released in 1990, the relationship between IBM and Microsoft became strained to the point that the companies decided to terminate their Joint Development Agreement,[15] which specified the partnership between the two firms for working on OS/2 (TechInsider.org, 2016). Because the Windows operating system was more developed when the companies ended their relationship, Microsoft rapidly picked up market share as its operating system was included on sales of IBM-compatible PCs. In fact, it was the relationship between IBM and Microsoft that initially drew attention from the United States Federal Trade Commission (FTC) in 1990.

The investigation by the FTC was initiated because of a joint news release by IBM and Microsoft during the Comdex trade show in Las Vegas, NV, on 13

November 1989 (Wallace and Erickson, 1992). In the press release, the companies claimed that 'Microsoft would hold back features for Windows in order to help industry acceptance of the OS/2 operating system' (Wallace and Erickson, 1992: 373). The FTC was concerned that the companies were colluding to control the market for operating systems. Ultimately, the FTC investigation ended in 1993 when the commissioners were split 2–2 on whether to bring an administrative action against Microsoft. In the same year, however, the Antitrust Division of the United States Department of Justice (DOJ) picked up the investigation, which would eventually lead to Microsoft's conviction for antitrust violations. The main issues in that case, however, did not centre around Microsoft's control of the operating system market but its business practices associated primarily with its Internet browser, Internet Explorer. Around the same time that Microsoft was seeking to solidify its position atop the computer software industry, at least three concurrent technological developments and their attendant cultural practices were emerging as challengers to the production model used by Microsoft in its rise to power. These developments were the emergence of the World Wide Web, the development of graphical web browsers, and the creation of Linux. Some of the early history of Linux has already been discussed in the introduction to this book, but some key moments in the rise of the World Wide Web and web browsers are also instructive for understanding competing models of software production. Specifically, the Browser Wars mark an important moment in the competition between Microsoft's model of software production and the emergent free and open source software movement.

3.2.1. The Browser Wars

To provide some brief historical context for the Browser Wars, earlier Tim Berners-Lee and Robert Caillau authored a proposal in November of 1990 for a hypertext project called the World Wide Web, which would provide 'a way to link and access information of various kinds as a web of nodes in which the user can browse at will' (Berners-Lee and Caillau, 1990). The creation of such a project relied on server-level applications to manage the nodes stored on the server and to facilitate the display and access of those nodes with a browser. Browsers served as the application running on a user's machine that could request access to the nodes stored on the server and display those nodes to the user. Web pages would need to be created that could store textual, graphical, or other types of information that could be accessed by users. By the end of the year in 1990, models of all these components had been created, and companies began developing browsers that would allow users to access the burgeoning technology of the World Wide Web.

In 1993, the Mosaic web browser was developed by a team of researchers at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign. The browser could display graphical

content on the web and, although it was not the first browser to do so, Mosaic dramatically increased the popularity of browsing the web. Prior to its creation, most of the pages on the World Wide Web had been primarily text-based. However, Mosaic's place in the history of web browsers is perhaps best illustrated by tracing the history of its ownership and, ultimately, its transformation into the open-source web browser, Mozilla Firefox.

From its beginnings at the NCSA at the University of Illinois, the Mosaic browser spawned at least two primary companies that sought to commercially exploit the browser's technology. One company was called Mosaic Communications, and the other was Spyglass. The code base for the Mosaic browser was handled by Spyglass after an agreement was signed between the company and the University of Illinois, whereby Spyglass would retain the rights to commercially exploit the code. The other company, Mosaic Communications, created the Mosaic Netscape browser. In fact, many of the employees at Mosaic Communications had worked previously on the Mosaic browser at the NCSA, although the Netscape browser was built entirely by the team at Mosaic Communications. What was truly novel about the Netscape browser, however, was that it was made freely available to the public for personal use, which was unprecedented up to that point. Moody (2001) describes the significance of this strategy:

> Along with a beta-testing program on a scale that was unprecedented, the decision to allow anyone to download copies of Netscape free had another key effect: It introduced the idea of capturing market share by giving away free software, and then generating profits in other ways from the resulting installed base. In other words, the Mosaic Netscape release signaled the first instance of the new Internet economics that have since come to dominate the software world and beyond. (187).

Indeed, the Netscape browser began to pick up market share, and the University of Illinois noticed. To resolve any additional trademark disputes with the university, Mosaic Communications changed its name to Netscape Communications and reissued its browser under the name Netscape Navigator (Moody, 2001).

Netscape Navigator quickly picked up market share from 1994–1996, reaching its peak at nearly 90% in April 1996, according to some sources (Cusumano and Yoffie, 1998). Riding this extraordinary wave of enthusiasm for Netscape, the company held its IPO in August 1995. On the day of its IPO, shares of the company began selling at $28 and reached $58.25 by the end of the day, valuing the company at nearly $3 billion after only 18 months of operation (Moody, 2001). At that point, Netscape's IPO was the largest in history. The success of Netscape was not lost on Microsoft, and the company began to focus its efforts on developing a browser to rival Netscape. This was the beginning of the first browser war.

Since Microsoft had not devoted any significant amount of time and resources to developing a web browser of its own, the company decided not to build its browser from scratch. Rather, Microsoft approached Spyglass, which held the rights to the code of the original Mosaic browser. Spyglass had been developing its own version of Mosaic, known as Spyglass Mosaic. Microsoft negotiated a licence to use the Spyglass Mosaic code base in exchange for royalty payments for each copy of the browser issued, with an annual cap of $5 million (Elstrom, 1997).[16] The resulting browser was called Internet Explorer (IE), which was based on the same foundation as Netscape. As evidence of how aggressively Microsoft pursued its new Internet strategy, Page and Lopatka (2007) note that the company only had five or six employees working in the browser department in 1995 but had more than 1,000 by 1999.

In addition to assigning more employees to the browser division, Microsoft began packaging IE with distribution of its Windows operating system. As Microsoft had nearly 90% of the market for operating systems because of its contractual relationships with Original Equipment Manufacturers (OEMs), the company was able to quickly make gains in the market for web browsers. In effect, Microsoft was giving away copies of IE for free by bundling it with its Windows operating system. To do so, the company began distributing versions of IE to OEMs by sending discs to the manufacturers, and eventually required the OEMs to install IE with Windows 95. OEMs were prohibited from 'modifying or deleting any part of Windows 95, including Internet Explorer, prior to shipment' because of a non-negotiable licensing restriction that Microsoft placed on OEMs (*United States vs. Microsoft*, 1999, see Finding 158). This restriction did not allow OEMs to ship new PCs without IE installed. The effect on the market for web browsers was almost immediate. Figure 3.1 shows the

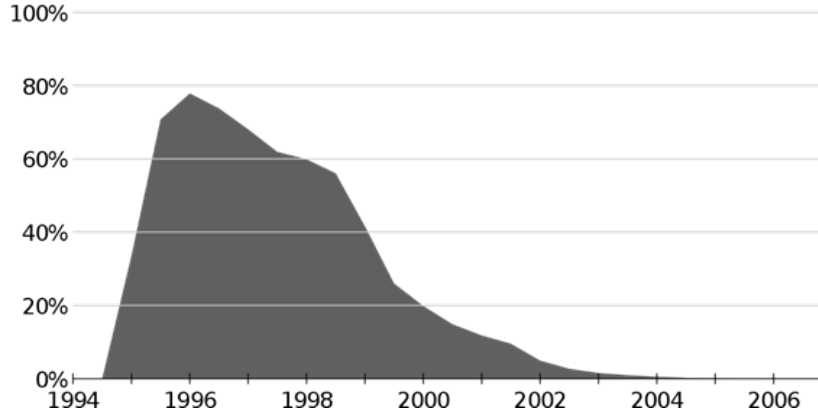

Figure 3.1: Netscape Navigator Usage Data 1994–2006 (image is in the public domain and available via Wikimedia Commons at http://commons.wikimedia.org/wiki/File:Netscape-navigator-usage-data.svg)

sharp rise in market share for the Netscape browser, and its eventual sharp decline.

Because of these tactics, Microsoft and its Internet Explorer emerged victorious in the first of the Browser Wars. Microsoft was simply too big and had too much power to influence the market for Netscape to compete. However, the novelty of distributing software freely for personal use was not lost on Microsoft. Netscape's Navigator browser rapidly picked up market share by using such a tactic, and Microsoft effectively gave away its IE browser by bundling it with its Windows operating system. Just as Microsoft was reaching its most dominant market position and using tactics that eventually led to its conviction for antitrust violations, Linux and the open-source model of production was beginning to grow as a potential threat. Indeed, after Netscape Navigator had lost significant market share to Microsoft, Netscape released the source code publicly in 1998 to attract development for a new browser. That new browser would eventually become Mozilla Firefox, which was first released in 2002. Microsoft took notice of this general trend toward open source as well and, in 1998, a series of leaked documents demonstrated exactly how Microsoft viewed this emerging threat. The Halloween Documents[17] were made publicly available and their authenticity was later confirmed by Microsoft (Harmon and Markoff, 1998). They will be discussed later in this chapter. Before doing so, however, Microsoft's conviction for antitrust violations needs to be discussed. In many ways, the antitrust conviction marks an important turning point, not just in Microsoft's history but in the broader history of the software industry.

3.3. The United States vs. Microsoft Corporation

Microsoft's activities during the Browser Wars ultimately led to its conviction for violations of Sections 1 and 2 of the Sherman Act. Section 1 of the Sherman Act prohibits 'every contract, combination …, or conspiracy, in restraint of trade or commerce...' (15 U.S.C. §1). Section 2 states it is unlawful for any person or firm to 'monopolize … any part of the trade or commerce among the several States, or with foreign nations. … ' (15 U.S.C. §2). The court ultimately found Microsoft to be in violation of both sections of the Act. Microsoft violated Section 1 by unlawfully tying its web browser – Internet Explorer – to its operating system. Furthermore, the company violated Section 2 by maintaining its monopoly power by anticompetitive means and attempting to monopolise the web browser market.

These convictions rested upon the fact that Microsoft engaged in anticompetitive behaviours in its contractual relationships with Original Equipment Manufacturers (OEMs). Specifically, Microsoft used 'contractual and, later, technological shackles in order to ensure the prominent (and ultimately permanent) presence of Internet Explorer on every Windows user's PC system, and to increase the costs attendant to installing and using [Netscape] Navigator

on any PCs running Windows' (United States, 2000: 11). In addition, Microsoft restricted OEMs from reconfiguring Windows 95 and Windows 98 in ways that could lead to greater use of Netscape Navigator. Finally, Microsoft 'used incentives and threats to induce' certain OEMs to design 'distributional, promotional and technical efforts' that would favour Internet Explorer instead of Navigator (*United States vs. Microsoft*, 2000: 11).

The final judgment in the antitrust case found that Microsoft had violated sections 1 and 2 of the Sherman Act, as well as more than 35 state law provisions in 19 states plus the District of Columbia. Considering these violations, the U.S. District Court Judge, Thomas Penfield Jackson, ordered Microsoft to divest its operating systems business operations from its applications business operations. In addition, all the intellectual property rights previously held by the two businesses were to be transferred to the Applications Division, which was required to grant a perpetual, royalty-free licence to the operating systems business so that it could license, develop, and distribute modified or derivative versions of the intellectual property. However, the Operating Systems Division was prohibited from doing this with the intellectual property related to the Internet browser (Internet Explorer). Aside from divesting the operations of these two businesses, Microsoft was ordered to transfer all the assets from either one of the divisions into a newly formed company, for which the transfer of ownership was to be accomplished by a distribution of stock to shareholders not connected with Microsoft. The intent of these decrees was to separate Microsoft's operating system business from the business operations that handled its web browser development. These actions would prevent Microsoft from engaging in the same types of anticompetitive behaviour that it had used during the Browser Wars.

3.3.1. Effects of the Decision

In 2001, District Judge Thomas Penfield Jackson recused himself from a related case – that went to appeal – because of some public comments that he made, which gave the impression that he had a personal bias or prejudice against Microsoft (Wilcox, 2001). In his place, U.S. District Judge Colleen Kollar-Kotelly took over the case and, in late 2001, approved a settlement between the parties. The approved settlement would no longer seek the breakup of Microsoft's Operating Systems and Applications Divisions. Instead, Microsoft agreed to a series of consent decrees in November 2002, whereby the company would be prohibited from retaliating against any OEM that develops, distributes, promotes, uses, sells, or licenses any non-Microsoft products (*United States vs. Microsoft*, 2002). In addition, Microsoft would need to establish a clearly documented schedule of all royalties that would be received from OEMs for its Windows Operating System. These provisions were aimed at prohibiting Microsoft from engaging in any anticompetitive behaviours, but most importantly for the purposes of

this analysis, Microsoft would also be forced to promote interoperability for its products. This would ensure that other companies could develop products that would operate smoothly with Microsoft's products. As such, Microsoft was ordered to disclose its Application Programming Interfaces (APIs), which would specify how software components should interact with one another. By releasing its APIs to independent hardware vendors (IHV), independent software vendors (ISV), OEMs, Internet Access Providers (IAPs), and Internet Content Providers (ICP), Microsoft would ensure those parties could develop software that could operate on and interact with Microsoft's operating systems and other software. Microsoft would also need to make any communications protocol available to third parties for the same purposes. The consent decrees to which Microsoft agreed were supposed to last five years from the decision in 2002. However, these decrees were renewed twice – once in 2006 and again in 2009 – and finally expired 12 May 2011 (Chan, 2011).

In effect, the antitrust ruling against Microsoft did not seek a breakup of the company into distinct operating units, but focused more specifically on Microsoft's intellectual property practices. The decrees forced Microsoft to disclose its APIs to third parties to encourage and support interoperability with its products. The logic was that doing so would curb the anticompetitive behaviour Microsoft had displayed during the Browser Wars and in its contract bargaining with OEMs, while promoting competition within the software industry. It is within this context that Microsoft's shift toward (but not completely to) open source can be viewed.

Nevertheless, the consent decrees had little effect on the economic performance of the company. The company experienced a dip in profits in 2001, but still maintained nearly $7 billion in profits during this time with a substantial jump in the 2005–2006 fiscal year. However, along with broader shifts occurring in the software industry at the time, they did have the effect of changing some of Microsoft's practices associated with open source. The date of the consent decrees perfectly coincides with Microsoft's creation of the Shared Source program. Furthermore, the end of the consent decrees in May 2011 coincides with the creation of the Microsoft Open Technologies Division in 2012. To understand more fully Microsoft's relationship with FLOSS, the remainder of the chapter charts the company's history with FLOSS, beginning with the Halloween Documents, then discusses the Shared Source program and Microsoft Open Technologies. The previous discussion in this chapter provides an important context within which Microsoft's shift toward FLOSS can be interpreted.

3.4. The Halloween Documents

In October 1998, Eric Raymond, a well-known member of the free and open source software community and author of *The Cathedral and the Bazaar*, received a series of internal documents from a confidential source that outlined

Microsoft's strategy against Linux and open source software. These documents were subsequently released to the public by Raymond and their authenticity was later verified by Microsoft. These documents became known as 'The Halloween Documents' because many were released near the end of October over different years. The Halloween Documents focus on Microsoft's assessment of the strengths and weaknesses of open source software, including Linux, and how the company could combat the growing popularity of the movement. What is clear from the documents is that Microsoft viewed free software products as a genuine threat to its own products, especially because the free software projects had 'acquired the depth and complexity traditionally associated with commercial projects' (Raymond, 1998a). As such, the Halloween Documents contain information about how Microsoft planned to combat open source software.

In Halloween Document I,[18] Vinod Valloppillil discusses open source software as a potential threat to Microsoft. Rather than focusing on a specific open source project or organisation, however, Valloppillil focuses on the process used in open-source software development. Valloppillil writes, 'to understand how to compete against OSS [open source software], we must target a process rather than a company' (Raymond, 1998a). He goes on to assess possible strategies for combating open source software, and gives special attention to 'FUD tactics,' an acronym for Fear, Uncertainty, Doubt. FUD is a tactic used in sales, marketing, public relations, and propaganda, whereby one attempts to instil those feelings in consumers about the quality of a competitor's products. For example, in an advertisement for Microsoft Server 2003, Microsoft claimed that research demonstrated 'Linux was found to be over 10 times more expensive than Windows Server 2003' (BBC News, 2004). Microsoft was asked to change the advertisement by the Advertising Standards Authority in the United Kingdom because the results of the study were deemed to be misleading to consumers. In effect, the advertisement was meant to instil FUD in consumers about the total cost of Linux.

Halloween Document II[19] largely contains a much more detailed technical analysis of Linux's functionality when compared to other products. The author also describes his personal experience with installing the DHCP Client Daemon and ultimately claims that, even though he was a poorly skilled UNIX programmer, he could easily figure out how to extend the DHCP client code and 'the feeling was exhilarating and addictive' (Raymond, 1998b). Importantly, however, the conclusion of the document suggests possible strategies for competing against Linux. The author admits that Linux was the greatest threat to Microsoft in the server market, and he also claims that a possible strategy for fighting Linux could be patent and copyright litigation.

Halloween Document III[20] is a document from Microsoft Netherlands in which Aurelia van den Berg, a Press and Public Relations Manager for the company, responds to the leak of the two internal documents in 1998. Her response downplays the significance of the leaked documents, claiming that all companies conduct assessments of their competitors, and the leaked documents do

not represent official Microsoft positions. At the end of the document, however, van den Berg still manages to criticise FLOSS in general for its inability to be a long-term solution. Alluding to the need for strong intellectual property protections, van den Berg claims, 'unless Linux violates IP rights, it will fail to deliver innovation over the long run' (Raymond, 1998c).

Documents VII, VIII, and X are the other documents directly leaked from Microsoft. The remaining documents are commentaries, satires, and criticisms of Microsoft created by others in response to the leaked documents. Halloween Document VII[21] provides the results of an internal survey conducted by Microsoft in 2002 about attitudes and opinions on FLOSS in general, Linux specifically, and familiarity with Microsoft's newly created Shared Source program. The results of Microsoft's internal survey showed that FLOSS in general and Linux specifically were viewed favourably by those included in the survey, which mainly included policymakers, decision makers, and corporate executives selectively chosen by Microsoft. The survey also showed that messaging designed to criticise or question the quality of FLOSS, Linux, or the GPL was not effective (Raymond, 2002a). Considering these findings, the authors recommend that Microsoft could more effectively compete with FLOSS by focusing on the total cost of ownership (TCO) of Microsoft products when compared with Linux. In addition, the authors recommend Microsoft focus on the benefits of its newly created Shared Source program.

Halloween Document VIII[22] was an internal email sent by Orlando Ayala, Group Vice President of Microsoft's Worldwide Sales, Marketing, and Services Group, to the heads of Microsoft's subsidiaries in 2002. The message was sent as a reaction to many governments and other large institutions beginning to transition to Linux. As such, Ayala suggests that Microsoft and its subsidiaries need to be better prepared to respond to those types of announcements by communicating those announcements internally so the company can try to respond to these cases directly. In short, the document suggests that Microsoft's internal communication needed to be more fully integrated to respond to their declining market share, particularly among large institutions.

Finally, Halloween Document X[23] was leaked in 2004 and features an internal email from the SCO Group in which the author discusses, albeit somewhat vaguely, the relationship between the SCO Group and Microsoft. The email appears to disclose the amount of money paid to SCO on behalf of Microsoft. Although not discussed at length here, the SCO Group was a software company that became infamous for engaging in legal battles over alleged intellectual property infringement in Linux related software. The SCO Group went bankrupt in 2007, but between 2003 and 2011 the company alleged that various Linux vendors had infringed copyrights belonging to it. These vendors notably included IBM, Novell, and Red Hat, but also Daimler-Chrysler and AutoZone. Particularly relevant for this discussion is the suggestion in Document X that Microsoft was contributing large amounts of money to the SCO Group to fuel intellectual property litigation against Linux and its vendors. This

would be consistent with some of the suggestions in the previous documents that possible strategies for combatting Linux would be copyright and patent litigation.

In sum, the Halloween Documents allowed direct access to Microsoft's assessment of FLOSS in general and Linux specifically. What becomes clear from the documents is that Microsoft believed Linux was a legitimate threat to its own products. However, Microsoft correctly placed the true value of FLOSS projects within the process of production. To compete against the perception that FLOSS projects provided at least the same level of quality as those of proprietary companies, Microsoft used FUD tactics to suggest that the open-source model of production was inherently unstable or not secure. Ironically, Microsoft's own survey data suggested that these tactics were not effective, nor were any attempts to criticise the FLOSS development model. Instead, Microsoft needed to shift its strategy to focus more on the quality of its own products, including its newly developed Shared Source program. The Halloween Documents provide an illuminating perspective on the internal culture of Microsoft during the critical years from 1998–2004 when it underwent somewhat of a transformation. The antitrust suit against the company began in 1998 and was ultimately decided in 2001, and the company developed its Shared Source program in 2001.

3.5. Shifting Toward the Commons

The preceding sections of this chapter described in detail some of the important historical moments that exemplify competing models of software production and the specific tactics used by Microsoft to solidify its dominance of the software market. Three concurrent factors ultimately led to Microsoft's change of position regarding FLOSS. First, the company was convicted of antitrust activities in 2001 and agreed to a series of consent decrees in 2002 that sought to curb the company's anticompetitive practices by requiring Microsoft to disclose its APIs to third parties. Second, the dot-com bubble burst, which marked the end of the massive speculative investment in web-based companies. Third, the rise of Linux and Linux-related businesses had demonstrated the commercial viability of FLOSS-based business models. Those business models – and the effectiveness of Linux – each relied on the *processes* involved in FLOSS production. In other words, the true source of value for FLOSS technologies and businesses was the labour performed by the FLOSS community, which provided a critical challenge to the existing models of industrial software production exemplified by Microsoft. Microsoft responded to these challenges by initiating a couple of different projects that claimed to be dedicated to FLOSS principles, although these initiatives were met with different levels of acceptance by the broader FLOSS community. The next sections chart the rise of two such projects: the Shared Source Initiative and the Microsoft Open Technologies Division.

3.5.1. Microsoft Shared Source

The Shared Source Initiative (SSI) began at Microsoft in 2001 to provide access to certain source code for debugging and reference purposes. While Microsoft had been releasing portions of its Windows source code to academic institutions and OEMs as early as 1991, the SSI expanded the range of code that was made available in 2001. The code made available under this program was protected by different licences, including the Research Source Licensing Program, Enterprise Source Licensing Program, ISV Source Licensing, OEM Source Licensing, Windows CE source code access, and others. While a detailed description of the specific rights granted by these licences and programs is beyond the scope of this analysis, these licences are mentioned here to demonstrate that the sharing of source code by Microsoft was not entirely new at the time of the antitrust ruling. However, these licences were not considered free software or open source in their true sense, because Microsoft still claimed copyright protection on the underlying source code. Under most of these licences, code was made available for academic and reference purposes, but the company prohibited redistribution of the code or limited distribution to those working on Microsoft software. In effect, these licences allowed others to view the source code, but they could modify it unless they adhered to the limitations set forth in the licences.

What was novel about the SSI in 2001 was the expansion of Microsoft's Shared Source program by the release of more types of source code as well as the creation of new licences that were designed to grant different types of rights to users. Most notable for the purpose of this project are the two licences that were submitted to the Open Source Initiative (OSI) for official registration as open source licences: the Microsoft Public License and the Microsoft Reciprocal License. Both were approved by the OSI in October of 2007 (Open Source Initiative, 2007). This marked the first time that Microsoft officially had a licence approved by the open source community, even though these licences were still not fully compatible with the GPL.

Indeed, some within the broader community viewed Microsoft's Shared Source Initiative and its new licences as simply a marketing ploy. Even Michael Tiemann, the president of OSI, the organisation that approved the licences, claimed:

> Shared source is a marketing term created and controlled by Microsoft. Shared source is not open source by another name. Shared source is an insurgent term that distracts and dilutes the Open Source message by using similar-sounding terms and offering similar-sounding promises. And to date, 'shared source' has been a marketing dud as far as Open Source is concerned. (Tiemann, 2007).

Microsoft's views differed from Tiemann's claim. In a speech in 2001, Microsoft Senior Vice President Scott Mundie noted that Microsoft's expansion of its

Shared Source Initiative may be viewed by some as a failed attempt at becoming an open source company. Mundie claimed this assertion would be false because, 'Shared Source is Open Source' (Mundie, 2001). Mundie continued by saying Microsoft would be incorporating many of the positive aspects of the FLOSS development, while continuing to preserve the company's strong intellectual property protections. Mundie went on to claim that FLOSS production was unstable as a business model in the long run because it was unsecure and subject to 'unhealthy "forking"' (Mundie, 2001). Chapter 4 will demonstrate how Mundie was incorrect in his assessment, and Chapter 5 will provide greater detail on 'forking'.

These vastly different assessments of the SSI are indicative of the contentious relationship between Microsoft and the FLOSS community. Although Microsoft had shifted its position toward FLOSS, the community still maintained a healthy scepticism about Microsoft's involvement in FLOSS projects. After all, Microsoft had a history of threatening intellectual property infringement suits against firms using Linux, even if Microsoft's stance began to thaw around the same time that Microsoft's Shared Source licences were approved by the OSI. In 2006, Microsoft agreed not to sue Novell's Linux users in exchange for a share of Novell's open source revenue, as Microsoft claimed that Novell was infringing its intellectual property. By reaching such an agreement, Novell reported that its Linux business had increased 243% through the first three quarters of the 2007 fiscal year (Lai, 2007). This agreement, as well as other similar agreements between companies using Linux and Microsoft, caused somewhat of a split within the FLOSS community as to whether companies should be signing such agreements. While the split existed in 2007, the lines of this split have blurred significantly in the years since these types of agreements began. Indeed, Microsoft opened an entire division of its company dedicated to open source, called Microsoft Open Technologies.

3.5.2. Microsoft Open Technologies and GitHub

Microsoft Open Technologies opened in 2012 to 'advance Microsoft's investment in openness including interoperability, open standards, and open source' (Foley, 2015). The creation of an entire subsidiary dedicated to open source signalled a shift in Microsoft's relationship to the broader open source community. Throughout Microsoft's history, isolated individuals or smaller working groups advocated for greater involvement in open source projects, but the creation of an entirely new subsidiary marked the first concerted institutional effort at direct involvement. Notably, the creation of the new subsidiary coincided with two major events at Microsoft. The first was the expiration of the consent decrees in 2011, and the second was the resignation of Steve Ballmer as Chief Executive Officer.

The consent decrees required Microsoft to make its APIs more openly available so that developers could create technologies that could easily interact with Microsoft's own. In other words, the consent decrees provided an impetus for

forcing the promotion of greater interoperability between Microsoft and non-Microsoft technologies. In addition, Microsoft expanded its Shared Source Initiative to make its code more openly available to the broader community. However, this move was met with some scepticism by the FLOSS community, particularly because most of the licences that protected the code did not comply with open source standards. This changed in 2007 when the OSI approved two Microsoft licences as open source.

In addition to the changes brought about by the consent decrees, Microsoft experienced a change in leadership shortly after Microsoft Open Technologies opened. CEO Steve Ballmer, who is credited with the 'Linux is a cancer' indictment, announced his resignation on 23 August 2013. He ultimately resigned in 2014, and Bill Gates stepped down as Chairman of the company. However, Gates was invited to serve as technology adviser to the newly appointed CEO, Satya Nadella. Nadella adopted a new approach to open source for the company, as indicated by the actions that the company took in the years following his appointment.

In 2015, Microsoft shut down its Microsoft Open Technologies subsidiary. Microsoft did not characterise the move as closing the subsidiary but rather as Microsoft Open Technologies 'rejoining' Microsoft (Foley, 2015). The claim was that a separate subsidiary was no longer necessary, as support for open source was now mainstream within Microsoft. Indeed, a little more than a year later in 2016 Microsoft officially joined the Linux Foundation as a platinum member (The Linux Foundation, 2016). The general trend toward Microsoft's increasing support of open source was also demonstrated by the company being the top contributor to open source code projects hosted on the web-based development platform GitHub in 2017 (Hoffa, 2017). The following year, in 2018, Microsoft acquired GitHub for $7.5 billion (Microsoft, 2018).

3.6. Why Open Source? Why Now?

Microsoft's relationship with open source provides a few instructive lessons for understanding the dynamics between capital and the commons. The company's initial strategy of relying on strong intellectual property rights and enforcing them ruthlessly while simultaneously framing open source as an adversary ultimately led to an antitrust ruling shortly after the turn of the twenty-first century. Throughout the 1980s and 1990s, Microsoft's closed-source strategy and partnerships with hardware manufacturers led to its tremendous growth within the software market. The findings of the antitrust case, however, revealed the darker side of this growth. The case highlighted the company's monopolistic practices in using its dominance in the market for personal computer operating systems to distribute copies of its Internet Explorer web browser. This marked an historical turning point not just for Microsoft, but of a more general trend that saw the end of the dot-com bubble in 2001 as well as a shift away from 'Web 1.0' business tactics.

In the years after the dot-com bubble burst in 2001, a host of new web-based companies arose that promised interactivity and a focus on the consumer. This era, which marks the rise of so-called 'Web 2.0' companies, was characterised by companies providing services rather than packaged software, controlling robust data sets that expand as more people use them, trusting users as co-developers of companies' products and services, harnessing collective intelligence, relying on customer self-service, providing software across multiple devices, and featuring lightweight user interfaces, development models and business models (O'Reilly, 2005). These technological features functioned ideologically insofar as they gave the illusion of participation, collaboration, and egalitarianism when, in fact, they merely justified the provision of personal data to corporate Internet Service Providers (ISPs), who, in turn, harvested and sold that data to advertisers (see Fuchs, 2011b).

This suggests that the antitrust ruling cannot be viewed as the sole factor that affected Microsoft's business model. Rather, the antitrust decision combined with the other emerging historical forces within the technology field – Web 2.0, the commercial viability of Linux, and the ideology of romantic individualism within start-up culture – to effect a change in Microsoft's business strategy. In 2002, only a year after the antitrust ruling, Microsoft launched its 'shared source' program, which provided greater access to some of its source code, but still placed restrictions on its modification and redistribution. Consequently, the program was widely viewed as somewhat of a marketing ploy and a strategy to gain a better reputation with the open source community.

When viewed in this way, Microsoft needed to embrace open source – not only because the consent decrees required a more open approach, but because the industry in general was trending toward collaboration, and Linux (or, more accurately, the *processes* involved in FLOSS production, which made technologies like Linux possible) was proving to be commercially viable. In part, Microsoft has an interest in promoting interoperability and open standards, which enable it to keep up with the always-changing technological landscape. But the company's turn to open source may also be viewed as a humble recognition that the commons-based peer production taking place within the FLOSS community was an efficient and effective model of industrial software production that could supplement its own business practices. Finally, Microsoft's foray further into open source by its acquisition of GitHub can be understood within this broader context as well. Not only does its ownership of GitHub make the company appear as a supporter of the FLOSS community more generally, but it is also indicative of a broader trend within the information services industry of providing platforms for software production rather than directly producing software. To be sure, Microsoft does still produce proprietary software in-house, but providing platforms for software production also places Microsoft in a strategic position that makes other forms of software production dependent on the company to a certain degree.

Microsoft remains the largest software company in the world, and it provides an example of how a corporation that was widely viewed as the antithesis to the FLOSS ethos eventually transitioned toward embracing open-source software. In effect, Microsoft is now seeking to incorporate elements of FLOSS production within its broader corporate structure. While Microsoft has not fully transformed into an open-source business, the company has shifted its position even while maintaining strong intellectual property protections over some of its core software. What is apparent, however, is that Microsoft's embracing of open source is indicative of many other large firms who are seeking to incorporate open source projects and processes into their corporate structures. Primarily, this move seems to be generated by a more general move toward cloud-based services (see Mosco, 2014). Indeed, this is further exemplified by IBM's acquisition of Red Hat, which is the largest and only publicly traded company whose business model is based entirely on free software. Exactly how the company is able to do this is the subject of the following chapter.

Notes

[12] The 'Open Letter to Hobbyists' is available via the Wikimedia Commons here: https://upload.wikimedia.org/wikipedia/commons/1/14/Bill_Gates_Letter_to_Hobbyists.jpg (last accessed 4 December 2018)

[13] The original name for 86-DOS was actually QDOS, which stood for 'Quick and Dirty Operating System,' but Seattle Computer Products changed the name to 86-DOS once it began marketing the product.

[14] There are many different accounts of what happened. One of the most popular stories claims that Kildall snubbed the executives from IBM by choosing to go flying in his personal airplane at the time the meeting was scheduled. Other accounts claim that Kildall's wife killed the deal by insisting on changes to the contract, and others claim that Kildall did not want to release the source code for CP/M to IBM. These stories are recounted on the DRI website, which can be found at http://www.digitalresearch.biz/HISZMSD.HTM (last accessed 4 December 2018)

[15] A digitised version of the Joint Development Agreement is available at https://tech-insider.org/personal-computers/research/acrobat/871126.pdf (last accessed 4 December 2018).

[16] This agreement would become a point of contention between Spyglass and Microsoft, as tracking the exact number of IE copies issued proved to be incredibly difficult. Ultimately, the dispute was settled in 1997 after Microsoft agreed to issue a one-time payment of $7.5 million and an additional $500,000 in 'software and other considerations' to Spyglass (Elstrom, 1997).

[17] The Halloween Documents can be found at http://www.catb.org/esr/halloween/ (last accessed 4 December 2018).

[18] Halloween Document I, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween1.html (last accessed 4 December 2018).
[19] Halloween Document II, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween2.html (last accessed 4 December 2018).
[20] Halloween Document III, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween3.html (last accessed 4 December 2018).
[21] Halloween Document VII, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween7.html (last accessed 4 December 2018).
[22] Halloween Document VIII, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween8.html (last accessed 4 December 2018).
[23] Halloween Document X, along with Eric Raymond's commentary, can be accessed at http://www.catb.org/esr/halloween/halloween10.html (last accessed 4 December 2018).