APPLYING SOURCE CLASSIFICATION RULES TO CLOUD COMPUTING TRANSACTIONS: LEASE OR SERVICE?

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I. INTRODUCTION

Over the past decade, cloud computing and cloud storage have transformed the way we think about computer infrastructure, processing capacity, and data storage.\(^1\) The genesis of cloud computing came from an idea analogous to the way we view the power grid: what if computing power was a utility just as electricity?\(^2\) In the 1990s, this so-called grid aimed to coordinate decentralized computing resources, implement standard network protocols, and deliver some level of computing services.\(^3\) What has evolved, cloud computing, operates on a scale unimagined by the grid, providing a service oriented environment that unlocks unlimited computing power and resources at the swipe of a credit card.\(^4\)

Prior to the advent of the cloud, service providers (those who provide online services to users via the internet) and businesses required the hardware infrastructure necessary to store and manage the software and data they provided.\(^5\) Further, individuals and organizations that required voluminous data storage were required to keep and maintain the infrastructure necessary to store that data.\(^6\) This model demanded high costs which stood as a barrier for those trying to break into the internet service market or any activity that required immense data storage or powerful computing.\(^7\) A prospective internet service provider with an innovative new idea had to purchase the computer hardware and software necessary to deploy their service, and scale that hardware to meet maximum demand, however infrequent.\(^8\)

Cloud computing providers resolve this capital obstacle by offering remote on-demand network access to hardware and digital content so that the hardware and software is not required to be housed on the premises of the customer.\(^9\) The rise of cloud computing severed the physical hardware requirement from innovative internet service ideas, as third-party infrastructure providers now offer access to the necessary hardware and software at pay-per-use rates.\(^10\) Cloud computing and cloud storage allow developers to create new innovative ideas and simply purchase the hardware and software access necessary, and nothing more, to deploy those ideas, while enjoying limitless on-demand scalability.\(^11\) The various clouds can be used to store remote data, to run applications that are housed in the cloud, or to deliver services, such as streaming video.\(^12\) Rather than accessing data or applications locally on a hard drive in the individual’s possession, the cloud allows remote access to hardware held by a cloud provider via the internet.\(^13\)

The innovative and novel solution that is “the cloud” carries with it novel international taxation challenges. The source of income is important because it will impact several important taxation determinations, namely whether income is subject to taxation in the United States and whether income generates potential foreign tax credits, among various other tax determinations.\(^14\) Although at its heart, this source question is a U.S. taxation issue, the broader

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3 Foster et al., supra note 1, at 11.

4 Id. at 2-3.

5 See Marston et al., supra note 1, at 176–77; ARMBRUST ET AL., supra note 2, at 1-2.


7 See Marston et al., supra note 1, at 176; ARMBRUST ET AL., supra note 2, at 1.

8 See Marston et al., supra note 1, at 177; ARMBRUST ET AL., supra note 2, at 1.


10 ARMBRUST ET AL., supra note 2, at 2.

11 Id. at 3.


13 Id.

global implications of income source and taxation rights are staggering, especially for developing nations.\(^\text{15}\) Globalization and the spread of mega multinational enterprises raises many questions that both influence and stem from U.S. taxation concerns. If the United States asserts that income generated from foreign customers of U.S. cloud providers is U.S. source income, it will assert a primary residence-based taxing right and refuse to grant foreign tax credits to offset any foreign taxation asserted by a foreign taxing jurisdiction.\(^\text{16}\) The U.S. taxing rules thus ripple through international taxing jurisdictions: a foreign jurisdiction must consider the economic consequences of imposing double taxation on U.S. cloud providers.\(^\text{17}\) Practically speaking, the developing foreign jurisdictions have given up on asserting source-based taxation rights to preserve investment in their country.\(^\text{18}\) All this is to say that U.S. source determinations may determine whether a foreign taxing jurisdiction will assert source-based taxing rights on U.S. cloud provider’s income from foreign customers, and under U.S. law, one must begin by determining what set of source rules apply.\(^\text{19}\)

The abstract nature of cloud computing raises several classification questions that will ultimately form the basis for determining the source of these multi-nation transactions.\(^\text{20}\) A cloud transaction typically combines some combination of storage space, computing resources, hardware and software maintenance, applications, interfaces, and data analytics.\(^\text{21}\) This multifaceted nature requires inquiry into a uniform classification as to the type of transaction into which cloud computing falls. In 2019, the U.S. Treasury issued proposed regulations titled, Classification of Cloud Transactions and Transactions Involving Digital Content (“Proposed Regulations”).\(^\text{22}\) The regulation provides a nine-factor balancing test\(^\text{23}\) set to determine whether a cloud transaction constitutes the provision of services or a lease of property.\(^\text{24}\)

This Article argues that the balancing test is cumbersome, complicated, and unnecessary; this issue stems from the overly broad definition of a cloud transaction used in the Proposed Regulations. Working through the factors in this balancing test, as explained below and in the examples within the Proposed Regulations, true cloud transactions will always constitute the provision of services.\(^\text{25}\) This Article argues that, as simplicity leads to ease in application, the Proposed Regulations must adopt a narrow definition which properly encompasses cloud transactions alone, followed by a clear statement that cloud transactions constitute the provision of services.\(^\text{26}\)

The remainder of this Article proceeds as follows: Section II of this Article discusses the four different models of cloud computing to familiarize the reader with the wide array of available products and the common nature of these models. Section III outlines the international tax source rules, classification considerations, and reclassification of a transaction based on an evolving map of factors used to differentiate between a lease and the provision of services.

\(^{15}\) See Yariv Brauner, *What the BEPS*, 10 FLA. TAX REV. 55, 65 (2014) (explaining that the assertion of taxing rights by developed nations relegates the claims of developing nations to mere concessions).

\(^{16}\) Id.

\(^{17}\) Id.

\(^{18}\) Id.

\(^{19}\) To determine the source of income under I.R.C. § 862(a), the taxpayer first must determine which of categories one through nine applies. These categories provide a rule for each type of income. Thus, if the taxpayer does not first know what type of income they have, they cannot place it in the proper category, and cannot determine the proper source rule to apply.


\(^{21}\) See Marston et al., supra note 1, at 179–80 tbl.1; Mell & Grance, supra note 9, at 2 (noting that pooled computing resources include networks, servers, storage, applications, and services).


\(^{23}\) The nine factors suggesting the provision of service are:

(i) The customer is not in physical possession of the property; (ii) The customer does not control the property, beyond the customer’s network access and use of the property; (iii) The provider has the right to determine the specific property used in the cloud transaction and replace such property with comparable property; (iv) The property is a component of an integrated operation in which the provider has other responsibilities including ensuring the property is maintained and updated; (v) The customer does not have a significant economic or possessory interest in the property; (vi) The provider bears any risk of substantially diminished receipts or substantially increased expenditures if there is nonperformance under the contract; (vii) The provider uses the property concurrently to provide services to entities unrelated to the customer; (viii) The provider’s fee is primarily based on a measure of work performed or the level of the customer’s use rather than the mere passage of time; and (ix) The total contract price substantially exceeds the rental value of the property for the contract period.

\(^{24}\) Id. at 40326.

\(^{25}\) Id.

\(^{26}\) See, e.g., id. at 40326–29 (illustrating that none of the examples result in a lease transaction).

This simple approach can also be used to narrowly define streaming transactions and classify them as the provision of services as well.
II. THE FOUR MODELS OF CLOUD COMPUTING

Cloud transactions can manifest in several forms geared toward accomplishing the above purposes of cloud computing and storage; namely, Infrastructure as a Service (“IaaS”), Platform as a Service (“PaaS”), Software as a Service (“SaaS”), and Function as a Service (“FaaS”). IaaS provides virtual networking, machines, and storage space on-demand so individuals and organizations are not required to purchase their own machines or infrastructure. The provider offering IaaS typically maintains and houses the servers while the customer can deploy and manage software and data on those servers.28 An IaaS deployment acts as the customer’s own datacenter that is housed remotely and free of maintenance. Amazon EC2 and S3, popular cloud computing products, are examples of IaaS.29

PaaS provides an additional layer on top of IaaS—a development environment housed in the cloud.30 Via the PaaS model, developers can pay for all the tools they need to build applications.31 PaaS is often geared toward application development, including virtual machines and server storage (like IaaS), as well as development tools, operating systems, and services necessary for building, testing, deploying, managing, and updating web applications.32 The Google App Engine is a well-known example of PaaS.33

The most comprehensive cloud form, SaaS, adds a third level of abstraction.34 SaaS takes cloud computing beyond storage and application development and provides complete software solutions in which the software is stored on the provider’s infrastructure.35 The average person may be most familiar with this cloud model, and may not realize that they use cloud computing resources daily.36 Email services like Gmail and Outlook are examples of SaaS models.37 The software and data that run these email systems are located on the provider’s servers; the customer is simply accessing it remotely when logging in to send and receive emails.38

Finally, lesser-known serverless cloud computing, sometimes called Function as a Service (“FaaS”), is a fourth cloud computing model.39 FaaS eliminates the need for customers to pay for idle computing time.40 With the

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28 See Bhardwaj, supra note 27, at 62–63.

29 Id. Additional, parallel examples of IaaS products include Microsoft Azure and Google Cloud.


32 Id.


36 Id.

37 See C.G. Lynch, Why Enterprises are Moving to Google Apps, Gmail, INFO WORLD (June 10, 2009), https://www.infoworld.com/article/2623921/why-enterprises-are-moving-to-google-apps--gmail.html [https://perma.cc/C98E-5GV7].


FaaS model, developers can write a piece of modular code and execute it in response to an event. In other words, unlike other models where the customer pays for an instance whether it is active or idle, under a FaaS model, the customer only pays when the code is triggered. When this happens, an instance spins up, executes the code, and then shuts down. AWS Lambda is an example of a serverless FaaS product.

The above models can be deployed in private, public, or hybrid environments. Private cloud deployments are developed for single organizations and may be located on that organization’s premises or the premises of a third-party provider. A public cloud is offered to multiple customers who share computing services. Despite sharing servers and computing resources, a customer’s data and applications are hidden from other cloud users. There are also hybrid deployments that feature a private cloud paired with a public cloud. Such developments provide the security benefits of a private cloud and the scalability and cost savings of a public cloud.

When utilizing cloud computing technology, one may wonder where their data is physically stored. When accessing software, a similar question arises: Where is a copy of the application stored? This question is not easily answered. Often a single “cloud” consists of many data centers spread throughout various geographic areas worldwide. For example, Microsoft Azure and Office 360 data centers are spread across ten regions in the Americas, fifteen regions in Europe, seventeen Asia Pacific regions, and six regions in the Middle East and Africa. For certain products, Azure allows the user to select which region their data will be stored and may copy the data to any other region in that geographic area. Under this model, a user could choose to have their data stored in the Northern Europe data center located in Ireland and Azure may copy that data to the Western Europe data center in the Netherlands. Azure could even move the data to the Netherlands all together. Other products do not allow the user to choose the location of their data, and Azure may use any of their global data centers. In this instance and under certain circumstances, the user may not know where their data is stored.

Amazon Web Services (“AWS”) has a similar global structure with data centers located around the world. AWS allows users to deploy applications via any of their data centers worldwide. Users can replicate their content and store it in data centers in several regions as well. Google Cloud allows users to select a single region where data is to be stored or a redundant distribution of data across the United States, European Union, or Asia.

These various examples raise several questions concerning geography. Where exactly is the digital content housed? On how many servers, and in how many countries, is the data currently stored? Even if the user knows

41. Id.
42. Id.
43. Id.
44. AWS Lambda, AMAZON WEB SERVICES, https://aws.amazon.com/lambda/?nc2=h_ql_prod_fs_lbd (last visited July 15, 2020) [https://perma.cc/SH2R-3DJJ].
45. Mell & Grance, supra note 3, at 3.
48. Id.
49. What are Public, Private, and Hybrid Clouds?, supra note 46.
50. Id.
54. Id.
55. Id.
56. Id.
57. Id.
59. Id.
62. Or more precisely, where should the law consider the data to be?
exactly where applications, content, and data are located, does it matter for tax purposes considering the user’s ability to access it worldwide and move it between regions arbitrarily?

III. SOURCE RULES AND TRANSACTION CLASSIFICATION

The United States taxes its residents on their worldwide income regardless of its source.63 This is not to say that source is unimportant for United States residents, as foreign source income that is taxed by a foreign state may give rise to foreign tax credits.64 The foreign tax credit subordinates the United States’ residence-based taxing right to the foreign country’s source-based taxing right.65 For non-residents, the source of their income may dictate whether the United States can tax it at all, as a non-resident’s foreign source income generally is not taxed by the United States.66 Further, from an international perspective, when the United States asserts a residence-based taxing right, it becomes difficult for developing nations to simultaneously assert a source-based taxing right because the additional layer of taxation may deter economic growth in that developing nation67. For this reason, income source determinations under U.S. law truly affect a global taxing dilemma.68

Internal Revenue Code Section 861 provides the source rules for various categories of transactions.69 Because of these rules, the form and substance of a transaction will determine whether the income from that transaction is U.S. source or foreign source income.70 For instance, personal services are sourced under the “place of performance” rule.71 Compensation for services that are performed in the United States is U.S. source income, while compensation for services that are performed outside of the United States is foreign source income.72 Rental income from tangible property is sourced according to where the tangible property is located.73 Royalty income generated from the licensing of intangibles is sourced according to where the intangibles are used, which is typically determined by the legal protection the licensee is paying for.74 Accordingly, if a licensee is paying to use software in the United States, the amount paid to the licensor is U.S. source income.

Personal services are subject to their own sourcing rule.75 However, simply calling a transaction a service contract does not automatically classify the transaction as a service since the true substance of the transaction may require reclassification.76 The foundation of this potential reclassification was built upon the Investment Tax Credit of the Internal Revenue Code of 1962 (“ITC”) and a series of administrative determinations, rulings, and memoranda relating to the application of that credit.77 In 1962, the ITC was created to allow a credit for taxpayers who purchased machinery, equipment, and certain other property, to encourage modernization and expanded investment in capital equipment.78 The property that qualified for the ITC was referred to as “section 38 property” which excluded “property used by a tax-exempt organization.”79 This meant that if a taxpayer purchased tangible personal property and leased it to a tax-exempt organization, that property would not be eligible for the ITC.80 But, if a taxpayer purchased tangible personal property and used it in its own business to provide services to a tax-exempt organization, it may still qualify

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63 I.R.C. Publication 54; see also, I.R.C. § 1.
64 I.R.C. § 901(b).
68 See Brauner, supra note 16, at 65.
69 I.R.C. § 861.
71 I.R.C. § 861(a)(3).
74 Id.
75 § 861(a)(3).
76 I.R.C. § 7701(c).
79 Id. at 16.
for the ITC. Thus, the distinction between whether a transaction was classified as a lease or service had significant tax implications.

Soon after the enactment of the ITC, guidance in the form of Revenue Rulings and Private Letter Rulings began to emerge, containing factors that the IRS would use to determine if a purported service contract was actually a lease of property to a tax-exempt organization. In the 1980s, courts began compiling these factors into a balancing test, the first being the Court of Claims in 1981. In Xerox Corp. v. United States, that court denoted two categories of factors that distinguish between leases and service contracts: (1) possessory interest factors, and (2) integrated operation factors.

Congress addressed the distinction between a lease and a service contract in the Deficit Reduction Act of 1984, including the new section 7701(e), which encompassed many of the factors raised by the IRS and the Court of Claims. Section 7701(e)(1) provides six factors used to determine if a service contract (or other arrangement) must be reclassified as a lease of property. The factors look at whether or not (1) the service recipient is in physical possession of the property, (2) the service recipient controls the property, (3) the service recipient has a significant economic or possessory interest in the property, (4) the service provider does not bear any risk of substantially diminished receipts or substantially increased expenditures if there is nonperformance under the contract, (5) the service provider does not use the property concurrently to provide significant services to entities unrelated to the service recipient, and (6) the total contract price does not substantially exceed the rental value of the property for the contract period.

In 1989, the Tax Court tackled an ITC case under the guidance of section 7701(e). In Smith v. Comm’r, the court determined that an agreement in which Compscan placed xerographic equipment on the premises of a hospital was a lease, not a service contract. Applying each of the six factors, the court concluded that: (1) the hospital had possession of the equipment because it was located on the hospital’s premises, (2) the hospital controlled the equipment because the hospital’s technicians and physicians operated it, (3) the hospital had a significant economic or possessory interest in the property because it leased the equipment for a large part of its useful life, (4) Compscan did not bear the risk of diminished receipts if it failed to perform under the contract because Compscan did not operate the equipment itself, (5) Compscan did not use the equipment to provide concurrent services to other customers, and (6) the monthly payment constituted the rental value of the equipment. All of the six factors in Smith indicated that the agreement was a lease.

The following year in Musco Sports Lighting, Inc. v. Comm’r, the Tax Court was tasked with classifying an agreement in which the taxpayer installed sports lighting on the premises of governmental and tax-exempt organizations. The contracts required that customers pay for the lighting via a “service agreement” in which they paid an annual fee for 4–5 years with the option to purchase the lighting out right at the end of that period. The court,

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81 See Rev. Rul. 68-109, 1968-1 C.B. 10 for the first ruling in which the I.R.S. noted the distinction between the provision of services and a lease of property to a tax-exempt organization.
83 See generally Xerox Corp. v. United States, 656 F.2d 659 (Cl. Ct. 1981).
84 Id. at 674-75 (This category contained four factors: (1) retention of property ownership, (2) retention of possession and control, (3) retention of risk of loss, and (4) reservation of the right to remove and replace property.).
85 Id. at 675 (The distinction here is whether the property is used by the taxpayer to provide service to the customer or whether the customer is using the property to provide service to itself.).
87 I.R.C. § 7701(e)(2); see also Tidewater Inc. v. United States, 565 F.3d 299, 304 (5th Cir. 2009).
88 I.R.C. § 7701(e)(1).
89 See generally Smith v. Comm’r, 57 T.C.M. (CCH) 826 (1989).
90 In Smith, the Tax Court also analyzed agreements involving a scanner and a camera but applied pre-section 7701(e) law as those agreements were entered into prior to the enactment of section 7701(e). See Smith, 57 T.C.M. (CCH) at 826, 832-33.
91 Id.
92 Id.
94 Id. at 19.
applying a pre-section 7701(e) formulation, held that: (1) the taxpayer did not have possession or control of the lights because they were installed on the customers’ athletic fields and the customers operated the lights, (2) the cost was calculated on an annual basis, and (3) the lights were not part of an integrated operation of equipment and services. Thus, the agreements were leases.

These two Tax Court cases provide insight into three of the more difficult classification factors. First, both cases appear to assign possession to the party that physically holds the property and control to the party who operates the property. This distinction may prove useful in the cloud computing context because a provider may physically possess a server while a customer exercises some degree of control over its operation. The Tax Court cases (and Xerox) also explain that the “part of an integrated operation” factor looks to whether the taxpayer is providing an integrated package of services and equipment rather than just equipment.

It was not until 2009 that a court considered the application of section 7701(e) outside the ITC context. In Tidewater Inc. v. United States, the Fifth Circuit first determined whether section 7701(e) is constrained to determinations involving the ITC, or whether section 7701(e) applies to any situation in which a transaction must be classified as a lease or service agreement. The court found that because the prefatory language of section 7701(e) expressly stated that the section is “[f]or [the] purposes of chapter 1,” it was clear that section 7701(e) is applicable beyond ITC determinations.

The court then applied the above six factors to determine whether provider Tidewater’s ocean-going vessel charters were service contracts or leases of the vessels. The charters were time-based and included a crew provided by Tidewater; otherwise, the recipient controlled when and where the boats traveled, as well as what cargo the ship carried. First, the court held that despite the presence of the crew provided by Tidewater, the customer was in physical possession of the vessel because the customer could dictate when and where the vessel traveled. Second, the customer controlled the vessel because it “directed the movement of the vessel, cargo, and passengers.” The control that the customer exercised over “the details of routine operation and maintenance” was outweighed by the control exercised by the customer. Third, weighing in favor of a service contract, Tidewater retained economic and possessory interest in the vessel. Fourth, weighing in favor of a service contract, Tidewater bore the risk of substantially diminished receipts in the case of nonperformance under the charters. Fifth, Tidewater did not use the vessel concurrently to provide services to other customers. Finally, Tidewater was compensated in excess of the rental value of the vessel, indicating that the customers were also paying for services.
Ultimately, the court determined that three factors suggested a lease and three factors suggested a service. The court concluded that, in this factual circumstance, the crucial factor was control; therefore, the charters were leases. A major takeaway for Tidewater, beyond just analysis of the factors, is the conclusion that section 7701(e) applies to all transactions; paving the way for an existing body of law to classify cloud transactions.

IV. APPLYING THE CLASSIFICATION RULES TO THE CLOUD

When it comes to cloud transactions, classification has proved elusive due to the intangible and unconventional nature of the cloud. When a customer launches an instance on Amazon AWS, they are paying for access to the physical server(s) on which it is stored and are paying for Amazon’s upkeep and maintenance of the server(s), the development of the interface, the scalability of the product, software, and various other services and benefits that accompany the physical space on a server. Does access to the physical server look like a lease? If so, what effect do the accompanying (and possibly more valuable) services have on classification? Despite this suggested duality, case law demands a single classification for integrated transaction. This illustrates the root of the balancing test of section 7701(e)—that is to determine whether the single transaction leans more towards the provision of services or more toward the lease of property. What exactly is the customer paying for? Is it the use of some physical property, namely access to servers? Or are the servers ancillary to the service that the provider sells, as in the hardware is just a necessary instrument for the provision of service?

In 2019, the Treasury issued proposed section 1.861–19 regulations (“Proposed Regulations”) to resolve the classification of cloud transactions. To accomplish this classification, the Proposed Regulations adapt the existing balancing test found in section 7701(e) to the world of cloud computing. The Proposed Regulations recognize that cloud transactions present a unique nature, as the network access inherent to cloud transactions differs from physical access to property. Due to these differences, the Proposed Regulations expand the multi-factor balancing test of section 7701(e) to a total of nine factors that indicate a service over a lease. The nine factors suggesting the provision of service are:

(i) The customer is not in physical possession of the property; (ii) The customer does not control the property, beyond the customer’s network access and use of the property; (iii) The provider has the right to determine the specific property used in the cloud transaction and replace such property with comparable property; (iv) The property is a component of an integrated operation in which the provider has other responsibilities, including ensuring the property is maintained and updated; (v) The customer does not have a significant economic or possessory interest in the property; (vi) The provider bears any risk of substantially diminished receipts or substantially increased expenditures if there is nonperformance under the contract; (vii) The provider uses the property concurrently to provide services to entities unrelated to the customer; (viii) The provider’s fee is primarily based on a measure of work performed or the level of the customer’s use rather than the mere passage of time;
and (ix) The total contract price substantially exceeds the rental value of the property for the contract period.125

The framework in the Proposed Regulations begins to translate the section 7701(e) balancing test into a form that fits cloud transactions, pending detailed clarification as to how certain factors are to be construed.126 This clarification requires analysis of each of the nine factors to determine what they tell us about the nature of the transaction. That is, whether the factor differentiates between a lease and a service in the context of cloud computing, and how each factor can be tailored to draw a relevant distinction.

To begin, it must be noted that as six of these factors emerge from a balancing test of which the complexities of the internet and cloud computing were far from thought, their application requires interpretation and adjustment to the cloud computing context.127 For example, the Proposed Regulations explain that the term “property” refers to “computer hardware, digital content, or other similar resources.”128 This definition leads to analysis of the first factor.

A. Physical Possession of the Property

Due to the above definition of property, whenever that term is invoked, the Proposed Regulations appear to call for a two-prong analysis: (1) physical property (computer hardware), and (2) intangibles (digital content and provision of services).129 Determining who has physical possession of the computer hardware is easy enough—determine the location of the datacenters (which physically house the servers) that the customer is accessing.130 If a provider delivers a server to the customer’s place of business and installs it on their premises, the transaction looks more like a lease.131 On the other hand, if the provider physically houses the server in its own data center, this suggests a service contract.132 As the hardware is tangible property, this factor is similar to a traditional classification of non-cloud transactions.133

Often, cloud providers couple their hardware access with extensive software platforms.134 The Proposed Regulations seem to suggest a necessity to analyze the digital content as “property” just as the physical hardware.135 If this is truly Treasury’s directive, it certainly presents challenges as computer programs have an intangible aspect that is separate and apart from the physical medium in which they are stored; therefore, possession of the physical medium (in this case the server) does not necessarily equate to possession of the digital content.136 If this factor is to apply at all to digital content, we must determine what the term “physical possession” could mean as applied to intangibles.

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125 Id. at 40326.
126 See Sprague, supra note 101, at 560–63.
127 See Mazar, supra note 14, at 15.
128 Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326.
129 Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326 (noting that property consists of both physical hardware and intangible digital content).
130 See, e.g., Id. at 40326–27 (Examples 1 and 2 refer to physical possession as it relates to possession of the servers.); see also Lauren G. Citrome, Note, Data Centers and REITS: Is There Real Estate in The Cloud?, 11 N.Y.U. J.L. & BUS. 191, 230 (2014).
131 See, e.g., Musco, 60 T.C.M. (CCH) at 18, 20 (holding that the provider did not have possession of lighting fixtures that it installed on the premises of its customers). This is a very unlikely scenario in a cloud computing transaction because much of the benefit associated with cloud computing stems from the relocation of servers to third party datacenters that are located off-premises.
132 See e.g., Smith, 57 T.C.M. (CCH) at 826, 831-32 (holding that the provider retained possession and control as it housed the machine on its own leased premises).
133 Prior to the Proposed Regulations, the IRS and courts often treated possession and control as a single factor. This led to many situations in which although the provider placed the property with the customer, it retained enough control to sway the IRS or court to hold that the provider retained possession despite not physically possessing the property. See Xerox Corp. v. United States, 656 F.2d 659, 676 (Ct. Cl. 1981), Rev. Rul. 70-313, 1970-1 C.B. 9; Rev. Rul. 68-109, 1968-1 C.B. 10. The Proposed Regulations and section 7701(c) separate physical possession and control into two factors, so I believe it is best to confine the physical possession analysis to the question of who physically holds the property (at least in the case of tangible computer hardware).
135 See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40327 (Example 3 contemplates a scenario where the customer is purchasing service access as well as access to a software platform.).
The term “possession” is a variable term and must be adapted to the type of property that is being analyzed.\textsuperscript{137} What could “physical possession” mean in the context of cloud computing and the proposed regulations? Physical possession cannot mean control over the digital content because the next factor in this balancing test is control. Therefore, it must be something more. In this context, physical possession of digital content can only mean that the party has downloaded the software onto his or her computer hardware. In this scenario, a different set of regulations apply because there has been a transfer of the digital content.\textsuperscript{138} In other words, if the customer ever takes physical possession of digital content, the transaction is now outside the scope of the proposed cloud regulations. For this reason, we need only consider who has physical possession of the computer hardware, which turns the analysis to the second factor.

\section*{B. Control of the Property}

Where a provider retains control over the property, the transaction looks like a service.\textsuperscript{139} On the other hand, when a provider cedes control of the property to its customer, the transaction takes on characteristics of a lease.\textsuperscript{140} Control is a measure of the extent to which the recipient may dictate how the property is operated, maintained, or improved.\textsuperscript{141}

Unlike the possession factor (which allows only for analysis of the hardware), the control analysis requires a two-part analysis: (1) control of the hardware, and (2) control of the digital content.\textsuperscript{142} This is because the Proposed Regulations acknowledge that, where possible, both hardware and software elements must be considered when characterizing the transaction.\textsuperscript{143} First, control of the computer hardware must be analyzed from the perspective of its tangible nature. The ability to manipulate the contents of the server or its intangible structure does not amount to control of the physical hardware.\textsuperscript{144} The first prong of the analysis requires determination as to who operates, maintains, and improves the physical computer hardware.\textsuperscript{145} Where the cloud provider is responsible for keeping the servers running, maintaining their components, and updating those components, when necessary, the first control prong favors a service.

The second prong of the control factor requires analysis of control over the intangible digital content—that is who operates, maintains, and improves any software.\textsuperscript{146} It simply cannot be that when a customer is able to remotely manipulate the digital content on a server, it is now in control of the intangible aspects of that server \textit{despite} an overarching control exercised by the provider.\textsuperscript{147} Instead, where the provider’s control over the digital content supersedes any control the customer has, this prong favors provider’s control.\textsuperscript{148} In reality, under all four models of cloud computing, the customer exercises some degree of control over digital content,\textsuperscript{149} but it is only able to manipulate digital content within a box, the parameters of which are set by the provider.\textsuperscript{150} The customer cannot access other data that may be stored on the same server, cannot change orchestration software, cannot modify the proprietary software

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\textsuperscript{137} Xerox Corporation v. United States, 656 F.2d 659, 674 (Cl. Ct.1981)
\textsuperscript{138} See Classification of Cloud Transactions and Transactions Involving Digital Content, \textit{supra} note 22, at 40324, 40327. Proposed regulation section 1.861 covers transactions in which digital content is transferred to the customer. Example 5 demonstrates how the downloading of software is not a cloud transaction.
\textsuperscript{139} \textit{Id.} at 40326; \textit{see also} Rev. Rul. 70-313, 1970-1 C.B. 9; Rev. Rul. 68-109, 1968-1 C.B. 10.
\textsuperscript{141} \textit{STAFF OF THE J. COMM. ON TAX’N, supra note 86, at 59; see also Citrome, supra note 130, at 230.}
\textsuperscript{142} Classification of Cloud Transactions and Transactions Involving Digital Content, \textit{supra} note 22, at 40326 (noting that property consists of both physical hardware and digital content).
\textsuperscript{143} See Classification of Cloud Transactions and Transactions Involving Digital Content, \textit{supra} note 22, at 40327-29 (illustrating, via example 3, 6, and 10, analysis of both hardware control and software control); Citrome, \textit{supra} note 130, at 230.
\textsuperscript{144} See Citrome, \textit{supra} note 130, at 230; Sprague, \textit{supra} note 119.
\textsuperscript{145} See Sprague, \textit{supra} note 101; \textit{see also STAFF OF THE J. COMM. ON TAX’N, supra note 86, at 59.}
\textsuperscript{146} \textit{See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 23, at 40329.}
\textsuperscript{147} See Sprague, \textit{supra} note 119; Citrome, \textit{supra} note 130, at 230.
\textsuperscript{148} This concept is closely related to virtualization. Virtualization hides the actual computing platform from the user and provides them an emulated interface that appears as its own individual machine despite being a virtual machine within a much larger actual machine. The user cannot escape this virtual machine. See Marston et al., \textit{supra} note 1, at 178.
\textsuperscript{149} And, in many cases, has no control over to software that runs the server.
\textsuperscript{150} \textit{See, e.g., Logical Separation on AWS, AWS (July 28, 2020), https://docs.aws.amazon.com/whitepapers/latest/logical-separation/logical-separation.pdf [https://perma.cc/43DN-PVT8].}
\end{small}
source code, and cannot suspend access to software for violations of rules and policies since only the provider can do that.\textsuperscript{151}

This model of the control dynamic in a typical cloud transaction helps to illustrate what a digital content control factor favoring a lease may look like. For customers to be in control of the digital content that they are paying for, the box must be removed, and the customer must have unfettered access to the server’s contents as well as unrestricted ability to modify the software that is on that server.\textsuperscript{152} Where there are no restrictions on access or ability to modify, it appears that the customer has control of the digital content involved in the cloud transaction, thus the second prong of this factor favors a lease.\textsuperscript{153}

C. Right to Determine Specific Property and Replace

A typical cloud computing transaction may identify the general location of the server(s) involved (for example, the country), but not a specific piece of hardware (as in a specific server).\textsuperscript{154} The cloud provider may select the server in which a customer’s information is stored and replace that server or move their data at will.\textsuperscript{155} This is indicative of a service contract.\textsuperscript{156} This is like the difference between a hotel and a rental property. If a customer pays for a specific beach home at a specific address, this appears to be a lease.\textsuperscript{157} But, if a customer pays an amount to a resort for any unit that matches the specifications of their purchase, and the resort selects the specific unit, this looks like a service. Additionally, if the provider can replace the property with similar property (switch a customer’s hotel room with another of the same specifications), it is further indicative of a service.\textsuperscript{158}

The Proposed Regulations contemplate something similar. For example, if the customer selects a specific server, say server number 1234, and the provider cannot replace that server with a comparable server, this factor suggests a lease.\textsuperscript{159} In a typical cloud computing transaction, the customer is not occupying an entire server and their data is often spread across several servers.\textsuperscript{160} When the customer purchases 1TB of space, for example, and selects a data center in Germany, the provider decides where to house the data within that datacenter. A transaction of this nature will always cause this factor to weigh in favor of a service contract. If, however, the customer contracts with a provider for a specific server, say server number 1234, and the provider cannot replace that server with one of the same specifications, this factor suggests a lease.

\textsuperscript{151} All of the cloud-based platforms run on Linux. Linux is based on a hierarchy of permissions. Typically, the providers retain root permissions that supersede any permissions that customers are granted, allowing the provider to retain ultimate control of the digital content. See, e.g., David Barrera et al., A Methodology for Empirical Analysis of Permission-Based Security Models and Its Application to Android, in CCS ’10: PROCEEDINGS OF THE 17TH ACM CONF. ON COMPUTER & COMM. SECURITY 73 (2010) https://doi.org/10.1145/1866307.1866317 (explaining how the android permission system allows the provider to retain ultimate control on an application and its digital content).

\textsuperscript{152} Or at least a degree of control that surpasses that of the provider. After all, one party may have a significant degree of control, but if the other party’s control far exceeds that, the control factor will lean in their direction. Where the customer controls digital content within a box and the provider controls the bounds of that box, the provider has far more control over the digital content.

\textsuperscript{153} In a typical cloud transaction, the provider will always retain control of their proprietary software, but in some sort of atypical hands-off arrangement, a provider could allow a customer to have free reign over a particular server. This will suggest a lease as to the digital content prong. Professor Mazur notes that a consequence of cloud computing, by definition, is that consumers have less control over programs and applications. See Mazur, supra note 14, at 10.

\textsuperscript{154} See Mell & Grance, supra note 9, at 2.

\textsuperscript{155} See Vaquero et al., supra note 1, at 53 (explaining that virtualization in cloud computing hides the heterogeneity of the underlying hardware, i.e., the customer does not know, let alone choose, the specific hardware that they are using).

\textsuperscript{156} See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326; see also Xerox Corp. v. United States, 656 F.2d 659, 675 (Cl. Ct. 1981).

\textsuperscript{157} See Rev. Rul. 71-397, 1971-2 C.B. 63 (noting that although the customer could select a certain model, the fact that the provider could select the specific machine suggested a service contract).


\textsuperscript{159} I question whether this distinction makes sense in a transaction where the physical item involved is fungible—like that of storage on a server. Who cares if you are paying for 1TB of space on Server 013456 or 1TB of space on Server 850303 as long as you are receiving the amount of space at the specifications you are paying for? If a provider had one hundred identical milk crates and you pay a fee to use ten of them for one day, does the ability to select which ten crates suggest anything significant? Let’s take this a step further. What if you will never even see the crates? Your movers are using them to move some things while you are away. This determination takes on even less importance, and in fact this factor simply is not relevant in a scenario where the tangible item is both fungible and unseen by the customer—a scenario like storage space for cloud computing.

\textsuperscript{160} See Mell & Grance, supra note 9, at 2 (explaining the multi-tenant model in which different hardware resources are dynamically assigned and reassigned).
Factors two and three—control and the right to determine specific property/replace it—are closely interconnected. Where a provider has the right to select which server the customer accesses, it likely also has control of that server.\textsuperscript{161}

D. Integrated Operation and Other Responsibilities

Factor number four seeks to determine whether the hardware and digital content are part of a larger integrated operation in which the cloud provider has other responsibilities, such as maintenance and updating.\textsuperscript{162} Looking to case law and administrative rulings, the larger question that this factor seeks to answer is whether the provider is using the property to provide a service to its customer, or whether it is providing the customer property so that the customer can provide a service to itself.\textsuperscript{163} To answer that broad question, courts look to whether the agreement couples property with services, such as maintenance and improvement,\textsuperscript{164} and whether the property is part of an interconnected network used to provide services.\textsuperscript{165}

A comparison by way of example illustrates the determination that the Proposed Regulations contemplate. If a cloud provider simply turns over the property to the customer—absent additional service such as maintenance, updating, or scalability via a broader network of servers that is integrated into a larger operation—this appears in favor of a lease.\textsuperscript{166} The provider does not provide services in addition to the property, and the property is not part of a larger integrated operation. But, where the cloud provider brings the provision of property into an integrated operation that also provides additional services, this appears to favor a service contract.\textsuperscript{167} Typical cloud transactions will follow the second example—the provider will maintain the servers and update the software on those servers, and each server will be part of an integrated network of other servers.\textsuperscript{168} This integrated network is evidenced by the provider’s ability to move customer data from one server, or even data center, to another.\textsuperscript{169}

E. Economic or Possessory Interest

When a contract conveys an economic or possessory interest to the customer, this fifth factor suggests a lease.\textsuperscript{170} The Joint Committee on Taxation’s explanation of section 7701(e) presents guidance to aid in determining whether a customer has an economic or possessory interest in the property.\textsuperscript{171} This explanation presents five situations in which a customer may have such an interest.\textsuperscript{172} According to the Committee’s explanation, failing any of these five situations will cause this factor to weigh in favor of a possessory or economic interest for the customer.\textsuperscript{173} The first situation states that a possessory or economic interest exists when the property’s use is dedicated to the customer for a substantial portion of the useful life of the property.\textsuperscript{174} In the cloud computing context, this would mean that a server has been assigned to a specific customer for a substantial portion of its useful life. For this scenario to make sense in the cloud computing context, a specific server in its entirety must be assigned to the customer for a substantial portion of its useful life. Therefore, this determination aligns closely with factor three explained above.\textsuperscript{175}

\textsuperscript{161} See Sprague, supra note 101, at 80 (Gary Sprague points out that factor three will help inform the control analysis.).
\textsuperscript{162} Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40327.
\textsuperscript{164} See Xerox Corp., 656 F.2d at 676–77 (integrated package of equipment and services).
\textsuperscript{165} See Smith, 57 T.C.M. (CCH) at 832. (“The camera did not constitute part of an integrated operation of services because the machine stood by itself in the Hospital and was not interconnected with a broad, integrated system designed to provide services.”).
\textsuperscript{166} See id. at 831. “The scanner and camera functioned independently and were not part of a larger process or operation.” Id. at 832.
\textsuperscript{168} See Mell & Grance, supra note 9.
\textsuperscript{169} Id.
\textsuperscript{170} STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 60; see also Citrome, supra note 130.
\textsuperscript{171} See STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 36, 60; see also Citrome, supra note 130, at 229 (stating the “economic and possessory interest in the property” is a factor under 7701(e)).
\textsuperscript{172} STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 60.
\textsuperscript{173} See id.; 26 Jeffrey J. Wong and Barry A. Dubin, Equipment Leasing \textsuperscript{10} 35.04 (26th ed. 2021).
\textsuperscript{174} STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 60; see also Smith, 57 T.C.M. (CCH) at 832.
\textsuperscript{175} If the customer is assigned anything less than a specific server in its entirety, the analysis under scenario one becomes complicated if not impossible. What is the useful life of a dynamic portion of a server? How can you determine useful life if the customer’s data is moved from one server to another?
The second and third situations ask whether the customer shares in the decline or appreciation in value of the property.\textsuperscript{176} In a cloud computing context, this asks whether a customer will share in appreciation or depreciation of the hardware and software value. The fourth situation hinges on whether the customer shares in any savings in operating costs.\textsuperscript{177} If a cloud customer received a reduction in fees due to decreases in maintenance and utility costs, this element would suggest a lease. Finally, the fifth situation looks to who bears the risk of damage or loss of the property.\textsuperscript{178} In a scenario, like most cloud computing agreements, where the provider is responsible for keeping the servers up and running, the risk of damage or property loss rests with the provider; therefore, this element suggests a service.\textsuperscript{179} However, in a hypothetical situation where the customer contractually agrees to cover the costs of such loss, this element may rest in favor of a lease. Though importantly, a key benefit to cloud computing is the shift of risk from the consumer to the cloud provider.\textsuperscript{180} In nearly all cases, these factors will favor the provision of services.\textsuperscript{181}

\section*{F. Risk of Diminished Receipts or Increased Expenditures}

Where the provider risks substantially diminished receipts or substantially increased expenditures due to the provider’s non-performance under the contract, this factor suggests a service contract.\textsuperscript{182} The Tax Court in \textit{Smith} explained what this means in the context of machinery.\textsuperscript{183} If the provider does not risk losing money because the machinery is down, the agreement looks like a lease.\textsuperscript{184} But, if the customer is not required to pay the provider when the property is not functional, this factor indicates a service contract.\textsuperscript{185} In a cloud computing transaction, this factor must analyze the economic consequences of server or software down time. If payment is suspended or discounted when the servers or the software are down, it indicates a service contract.

For example, AWS explains in its Amazon Compute Service Legal Agreement that they will “use commercially reasonable efforts” to maintain a “Monthly Uptime Percentage of at least 99.99%.”\textsuperscript{186} If downtime exceeds that 0.01% allowance, AWS provides a service credit based on the amount of down time.\textsuperscript{187} In this case, AWS bears the risk of diminished receipts if it is unable to perform at the specifications listed in the agreement. Therefore, this factor weighs in favor of a service.

\section*{G. Concurrent Use}

Where a provider uses property concurrently to provide significant services to unrelated entities, the agreement is indicative of a service contract.\textsuperscript{188} If the provider turns over the use of the property to the customer in a way that it cannot or does not provide services to other customers, this factor suggests a lease.\textsuperscript{189} The reason for this distinction is that a lessor characteristically gives up use of the property when she leases it to the lessee.\textsuperscript{190}

As to the hardware, when a cloud provider uses its servers to provide concurrent services to various unrelated customers, it indicates a service. But, again, further analysis is required regarding the digital content. If the provider uses its software to provide services concurrently to multiple customers, this also indicates a service. If a provider creates digital content for a single customer and does not use it concurrently, this suggests a lease.

\textsuperscript{176} STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 60.
\textsuperscript{177} Id.
\textsuperscript{178} Id.
\textsuperscript{179} See, e.g., Tidewater Inc. v. United States, 565 F.3d 299, 306 (5th Cir. 2009) (“Tidewater bore the risk of loss if anything happened to the vessel.”).
\textsuperscript{180} See Mazur, supra note 15, at 10.
\textsuperscript{181} Id.
\textsuperscript{182} Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326; STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 60.
\textsuperscript{183} See Smith, 57 T.C.M. (CCH) at 832–33.
\textsuperscript{184} See id. (stating that the manufacturer provided maintenance on the machines via a service contract; if the machines went down, it had no effect on the provider’s fee because they were not responsible for the maintenance); see also Rev. Rul. 71-397, 1971-2 C.B. 63, 64 (stating in this situation the customer pays for maintenance outside of regular service hours).
\textsuperscript{185} See, e.g., Tidewater Inc. v. United States, 565 F.3d 299, 306-07 (5th Cir. 2009).
\textsuperscript{186} Amazon Compute Service Legal Agreement, AMAZON WEB SERVICES (Mar. 19, 2019), https://aws.amazon.com/compute/sla/ [https://perma.cc/8HA4-CP7G].
\textsuperscript{187} Id.
\textsuperscript{188} See Xerox Corp. v. United States, 656 F.2d 659, 674 (Cl. Ct. 1981); STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 27.
\textsuperscript{189} See, e.g., Smith, 57 T.C.M. (CCH) at 832-33.
\textsuperscript{190} See Xerox Corp., 656 F.2d at 672, 674.
H. Fee: Passage of Time or Work Performed

The Proposed Regulations suggest that when a fee is based primarily on the amount of work performed, rather than the passage of time, this fact is indicative of a lease.191 This factor takes on its own significance in the cloud computing context as “work performed” translates to server space used, computing power, data transferred, or other computing metrics.192 While many offerings from the largest cloud providers base their fees on these metrics, the same providers also offer fee models based solely or significantly on the passage of time.193 Where a cloud provider offers unlimited storage for a set fee per month, this factor points to a lease. When the provider requires fees based on the amount of data transferred or a metric of computing power consumed, this factor points to a service.

Most data storage plans utilize fees based on the passage of time while arrangements that involve computations and computing base fees on some measure of computing power.194 For this reason, products that primarily offer data storage will often tip this factor toward a lease while products that offer primarily computing power will typically favor a service.

I. Contract Price Exceeds Rental Value

If the total contract price of an agreement substantially exceeds the rental value of the property, the customer is paying for something beyond a lease of property, such as a service.195 On the other hand, when the contract price simply reflects the rental value of the property, the customer is simply paying for the use of that property (a lease) rather than a broader integrated operation that includes substantial services.196 While it is difficult to determine an exact rental value of the servers and hardware that large cloud providers use due to custom construction,197 it may be possible to look to comparable hardware and its current rental value. The same can be said about computer software since much of this property is developed exclusively for deployment in the very cloud computing transactions this Article is attempting to analyze.198

Fortunately, this is unnecessary, as it appears that this factor is simply a byproduct of factor number four—is the property part of an integrated operation in which the provider has other responsibilities? If the property stands by itself and the provider has no other responsibilities, such as maintenance or updating, the contract price will typically reflect the rental value of that property.199 On the other hand, when additional services are coupled with the property, the company increases the price to reflect those increased responsibilities.200 This begs the question: Do we really need to figure out the rental value of a given amount of server space plus the rental value of any digital content, and compare that estimate to the fees the provider charges? Most likely not. It seems proper to conclude that where there are substantial responsibilities and services provided beyond just use of the property, the fees will substantially exceed the rental value of the property.

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191 Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326.
193 Amazon Web Services, Microsoft Azure, and Google Cloud all offer services with these pricing models.
195 Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326; see also STAFF OF THE J. COMM. ON TAX’N, 98TH CONG., supra note 86, at 27.
196 Id.
199 See, e.g., Smith, 57 T.C.M. (CCH) at 832-33 (concluding that because the provider did not perform any services along with the property, the fee was presumably the fair rental value of that property).
200 See, e.g., Tidewater Inc. v. United States, 565 F.3d 299, 307 (5th Cir. 2009) (explaining that part of the fee was attributable to services that were provided along with the property).
V. CURRENT CLOUD OFFERINGS: HOW DO THEY FIT?

After taking a detailed look at each factor, it is helpful to apply this structure to some of the popular cloud offerings currently on the market to get a feel for how existing products fit within the Proposed Regulations. AWS is a leader in the cloud computing industry and is on target to reach $40 billion in revenue this year.\(^1\) AWS offers a voluminous catalog of products,\(^2\) with some of their most popular being Amazon Simple Storage Service (“S3”), Amazon Elastic Compute Cloud (“EC2”), and AWS Lambda.\(^3\) Other companies like Microsoft Azure and Google Cloud offer comparable computing, storage, and serverless products,\(^4\) as discussed below.

EC2 is an IaaS platform that provides scalable computing in the cloud.\(^5\) With EC2, the customer can create a virtual server called an instance with “various configurations of CPU, memory, storage, and networking capacity.”\(^6\) When the customer launches an instance, they can select a single availability zone, multiple availability zones, or allow Amazon to select where the instance will be physically located.\(^7\)

How does EC2 fit into the Proposed Regulations framework? First, Amazon retains physical possession of the servers and computer hardware in its data centers located in availability zones around the world.\(^8\) Second, Amazon also has control over both the hardware and software that is used to administer EC2 instances. The customer cannot physically touch the servers or hardware let alone move or manipulate them.\(^9\) Further, the customer cannot alter the software or escape the box that Amazon fixes.\(^10\) Third, although the customer may choose the availability zone within which their data will be stored and the hardware will be located, Amazon selects the specific server and can replace the server or move data to another server at any time.\(^11\) Fourth, EC2 instances are part of a massive integrated operation in which Amazon has other responsibilities, such as maintenance and improvement.\(^12\) Amazon’s network of servers spans the globe in order to provide services to a great number of unrelated customers.\(^13\) Fifth, Amazon retains economic and possessorial interest in the hardware and the proprietary software used to provide EC2 instances.\(^14\) This is clear because it is Amazon who bears the risk of damage or loss of property, that is, if a server is destroyed, that burden is on Amazon.\(^15\) Sixth, when Amazon’s system is down, they face diminished receipts as their user agreement provides for fee reduction for system downtime.\(^16\) Seventh, Amazon uses the property, both hardware


\(^{8}\) See id.


\(^{10}\) See AWS Customer Agreement, supra note 209.

\(^{11}\) See Regions, Availability Zones, and Local Zones, supra note 207.

\(^{12}\) See What is Amazon EC2?, supra note 206.


\(^{14}\) See AWS Service Terms, supra note 209.


and software, to provide concurrent services to many customers around the world.217 Eighth, Amazon’s EC2 fee is primarily based on computing power—a measure of work performed as opposed to the passage of time.218 Ninth, the total contract price exceeds the rental value of the property because the provider has other responsibilities that the customer pays for.219 With Amazon EC2, every factor suggests a service. In general, available cloud services that sell computing power, such as instances, will always result in a service contract.

What happens with storage solutions such as Google Cloud Storage? Google Cloud Storage provides “globally unified, scalable, and highly durable object storage for developers and enterprises.”220 Customers can select a worldwide region, a dual region (which places the data redundantly in two regions “such as Finland and the Netherlands”), or a multi-region which places the data in a large geographic area made up of several regions.221 As to the Proposed Regulations factors, all result in the same outcome as the above EC2 analysis, except factor eight, since the providers fee is not based on a measure of work performed, but rather on the passage of time.222 Google Cloud Storage, like most storage models, offers a tiered payment structure that is based on usage per month.223 This factor, and only this factor, suggests a lease. With eight factors in favor of a service and one factor in favor of a lease, Google Cloud Storage, like similar offering from major providers, will be classified as a service.

A final example, so-called “serverless” cloud computing, results in the same outcome as the EC2 analysis—every factor favors a service contract.224 These three examples are just a few among immense offerings of cloud computing products. This Article will save the reader from analysis of every cloud product on the market, for simply stated, I have yet to encounter a current offering that comes close a lease. This begs the question: can a cloud transaction based on the current definition result in a lease?225

VI. A HYPOTHETICAL LEASE?

Unable to find an example of an available cloud product that must be classified as a lease, this Article endeavors to create one to see if such a transaction is practical or even possible. As a preliminary matter, this Article aims to answer some categorical questions that hinge on practicality.

A. Can a Lease Exist Where the Servers Remain on the Provider’s Premises?

As mentioned earlier, the Proposed Regulations’ balancing test has several interdependent factors.226 Often the interdependency is one of practicality. It just would not be practical to have one fact without the other. Possession, as one of the most influential factors, controls the direction of several other factors.227 Practically speaking, a provider will always have control over hardware that it has physical possession of.228 The provider that possesses the property

219 See Amazon EC2, supra note 205.; see also supra text accompanying note 140 (explaining that fees will exceed rental value when the provider has other responsibilities like maintenance and updating).
223 Id. The Google Cloud fee structure charges a fee based on gigabytes per month. For example, a user that requires 500 gigabytes of storage will pay $0.12 x 500 gigabytes per month. I analogize this to a lease in which the lessee pays $700 per month for a studio apartment, $1,000 per month for a one-bedroom apartment, or $1,200 per month for a two-bedroom apartment. This is the same size/time fee structure as Google Cloud Storage uses.
225 See Gary Sprague, Proposed Cloud Transaction Regulations: Analysis of the Classification Factors Derived From §7701(e), 48.11 TAX MGMT. INT’L J. 572 (2019).
226 See supra Section IV.G; see also Sprague, supra note 225.
227 See Sprague, supra note 101.
228 It would be a very strange transaction indeed if the provider housed the hardware on its premises, but the customer was responsible for operating, maintaining, and improving those servers. See STAFF OF THE J. COMM. ON TAX’N, supra note 86, at 59–60 for the elements of control. Further, this would sacrifice a key advantage inherent in cloud transactions, that is the outsourcing of hardware maintenance and improvement. See Mell & Grance, supra note 9, at 2 ("The consumer does not manage or control the underlying cloud infrastructure . . .").
will always have additional responsibilities, such as maintenance and repairs.229 Further, where the provider has additional responsibilities, it will charge the customer more than the rental value of the property.230 Four factors will typically move as one. It is worth nothing that these factors are not equally weighted, and it seems clear that possession and control demand more influence.231 In this way, it is hard to imagine that a transaction can be classified as a lease while the provider retains possession and control of the property.

B. Does it Make Sense to Create a Cloud Transaction in which the Hardware Sits on the Customer’s Premises?

It is important to keep in mind the key advantages of cloud computing during this analysis. Businesses turn to cloud computing because it offers unlimited scalability, cost savings, speed, performance, and reliability.232 When the hardware is placed on the customer’s premises, several of these advantages are undermined. For one, on-demand scalability is eliminated.233 When the hardware is housed in massive provider data centers, the customer can increase storage capacity and computing power instantaneously as additional provider assets spin up as needed.234 This cannot occur when the maximum amount of storage or power is capped by the amount of hardware on the customer premises, reminiscent of the days before the cloud.235 As follows, the cost savings associated with this instant scalability as well as the speed and reliability are not present when scalability is not available.236

With these key advantages gutted, it seems impractical to create such a transaction, but to be sure, what would that transaction look like? The transaction this Article tepidly envisions is one in which the cloud provider places the computer hardware on the premises of a company and removes all barriers to control over access to the hardware and software aspects of the servers.

In this hypothetical transaction, the customer would have physical possession of the hardware since it would be physically located and installed on their premises, favoring a lease.237 The customer will have control over the computer hardware with responsibility for maintenance and updating, either through its own IT department or a third-party maintenance contract.238 Further, the customer may have control over the software as it can access anything on the servers, add any software it pleases, and alter that software in anyway.239 The box is removed, and the provider does not have control digital content. The duality of control over property (hardware and software) together suggests a lease. The cloud service provider can then select the specific property to be used, and even replace it with similar property, suggesting a service.240 The property will not be part of an integrated operation, as it will not be connected with a provider’s larger network.241

Further, the customer will use the property to provide services to itself, and the provider will not have additional responsibilities, like maintenance and updating.242 The customer may make use of the property for a

229 Id.
230 See supra Section IV.1.
231 See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 23, at 40326; see also Sprague, supra note 118, at 2-3; see also Mazur, supra note 14, at 24 (noting that an element of cloud computing is that that cloud vendor bears the risk of loss and retains control of the software and hardware).
232 See Mell & Grance, supra note 9, at 2; Marston et al., supra note 1, at 176-77; see also Foster et al., supra note 1, at 1–2.
233 See ARMBRUST ET AL., supra note 2, at 1–2; see also Marston, supra note 1, at 176–77.
235 See ARMBRUST ET AL., supra note 2, at 1–2.
236 See id.; see also Marston, supra note 1, at 176–77.
237 See, e.g., Musco, 60 T.C.M. (CCH) at 20 (explaining that the customer had possession of sports lighting because the lights were installed at the customer’s athletic fields across the country); Smith, 57 T.C.M. (CCH) at 832-33 (camera and xerographic equipment).
238 See, e.g., Smith, 57 T.C.M. 826 (explaining that the xerographic equipment was maintained by the manufacturer rather than the provider).
239 Possibly the company uploads its own proprietary software onto the servers. I presume a scenario like this for the purpose of exploring the outer limits with this hypothetical transaction.
240 This is similar to the machinery that the provider placed in the customer’s manufacturing business. The customer could select the model, but the provider selected the individual machines and could replace them if need be. Due to the fungibility of individual servers, it seems unlikely that the customer would care to select a specific machine and refuse a replacement of the same specifications. See e.g., Rev. Rul. 71-397, 1971-2 C.B. 63.
241 See Smith, 57 T.C.M. (CCH) at 832 (not connected to a broader network).
242 See Xerox Corp. v. United States, 656 F.2d 659, 675-76 (Ct. Cl. 1981) (noting the distinction as to whether the property is used by the taxpayer to provide service to the customer or whether the customer is using the property to provide service to itself).
substantial part of its useful life, the parties may contract in a way that the customer receives a fee reduction when the provider saves on expenses and may take on risk in the case of damage to the servers by agreeing to cover repair and replacement costs. These prongs of the economic or possessory interest factor cumulatively suggest a lease. Additionally, if the customer agrees that there will be no reduction in fees due to downtime of the hardware or software (since it will be responsible for maintaining it), the provider will not bear the risk of diminish receipts or increased expenditures, suggesting a lease. Since the servers are on the customer’s premises and setup up for their exclusive use, the provider does not provide concurrent use of the property to other unrelated customers, suggesting a lease. The fee would be primarily based on the passage of time, rather than the computing power used, suggesting a lease. Finally, the total contract price would be the rental value of the property because the property does not come with and additional services. This also suggests a lease.

As noted above, the factors that trigger the domino effect toward a lease are the possession and control factors. Once possession and control are shifted to the customer, it is rationally possible to start shifting other factors toward a lease characterization. For example, once possession and control are both shifted to the customer, it is possible to imagine a transaction in which the customer is responsible for maintenance and updating. Once the customer is responsible for these tasks, other factors, such as risk of increased expenditures, integrated operation, contract price as rental value, etc., begin to follow. What is most interesting to note here, however, is that this hypothetical transaction looks nothing like a cloud transaction. Instead, the transaction just looks like a lease. The provider takes the computer hardware, drops it off at the customer’s place of business, and tells them “you are on your own, be sure to send our monthly fee.” The advantages of cloud computing—scalability, cost savings, speed, performance, and reliability—are absent. Thus, one must wonder how this type of lease transaction could be captured under the current Proposed Regulations.

VII. A BETTER SOLUTION: DEFINITIONAL REFINEMENT

As illustrated above, the Proposed Regulations demand a great deal of multi-faceted analysis and unweighted balancing to arrive at a forgone conclusion—cloud computing is a service. This definitive conclusion stems from a comprehensive dive into the definition of what cloud computing truly is. True cloud computing consists of several essential characteristics inextricably tied to the benefits that drive customers to adopt the cloud. Some of these characteristics include on-demand self-service, broad network access, resource pooling, rapid elasticity (scalability), and measure service.

The essential characteristics of cloud computing elucidate a potential solution to the complexities of a multi-factor balancing test. The problem is a definitional one. The Proposed Regulations, presumably relying on a simplified and expansive reading of the National Institute of Standards and Technology definition (“NIST”), define a cloud transaction as “a transaction through which a person obtains non-diminimis on-demand network access to computer hardware, digital content . . . or other similar resources.” This only encompasses the first essential element of the

243 See, e.g., Smith, 57 T.C.M. (CCH) at 832 (significant portion of equipment’s life).
244 See, e.g., Tidewater Inc. v. United States, 565 F.3d 299, 306 (5th Cir. 2009) (“The customer did share in some of the benefits of any reduction in operating costs . . . ”).
245 Cf. Xerox Corp., 656 F.2d at 675 (explaining that because the provider was responsible for machine loss or damage, the transaction appeared more like a service contract than a lease).
246 See, e.g., Smith, 57 T.C.M. (CCH) at 830 (arguing that because the provider did not operate the machines and was not responsible for maintenance, there was no risk of diminished receipts if the xeroxographic equipment went down).
247 Id.; see also Tidewater, 565 F.3d at 307.
248 See, e.g., Musco, 60 T.C.M. (CCH) at 20; Smith, 57 T.C.M. (CCH) at 832 (the camera). In a cloud computing context, this sort of fee arrangement is typical to cloud storage solutions.
249 See Smith, 57 T.C.M. (CCH) at 833 for the proposition that where there are no additional services coupled with the property, the court presumes that the fee is equal to the rental value of that property.
250 See supra Section VI.A.
251 See Sprague, supra note 23.
252 See Mell & Grance, supra note 9, at 2; Marston, supra note 1, at 177–78; Vaquero et al., supra note 1, at 51; Foster et al., supra note 1, at 1–2.
253 See Sprague, supra note 20; see also Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40319. Even the Proposed Regulations note that the analysis should generally result in a service.
254 See Mell & Grance, supra note 9, at 2.
255 See id.; see also Marston, supra note 1, at 177–78; Bhardwaj et al., supra note 27, at 60–61; Vaquero et al., supra note 1, at 51; Foster et al., supra note 1, at 1–2.
256 See Mell & Grance, supra note 9, at 2.
257 Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 13, at 40319.
NIST cloud definition, and seemingly would include a transaction similar to this Article’s hypothetical—a transaction that is just a lease of computer servers and not a cloud transaction at all.258 Definitional specificity that reflects the true character of a cloud computing transaction would exclude any lease examples from the Proposed Regulations.

First, the definition in the Proposed Regulations must include language requiring scalability of resources, that is, the customer can dynamically reconfigure resources in real time as demand increases or decreases.259 The NIST definition upon which the definition in the Proposed Regulations is based, recognizes rapid elasticity (scalability) as an essential characteristic.260 Adding scalability as a key element of the Proposed Regulations’ definition would eliminate potential lease scenarios that do not comport with this key aspect of the cloud computing model.

Further, where apparent unlimited scalability exists, resource pooling must also exist. Resource pooling occurs when a provider uses its resources to serve multiple consumers by dynamically assigning and reassigning those resources based on consumer demand.261 This is a natural extension of scalability because a provider will put unused resources to work. Where massive datacenters are constructed to provide a customer with apparently unlimited scalability, this infinite appearance is created by shifting resources between various customers. As NIST suggests, this aspect belongs in the Proposed Regulations’ definition.262

With these two minor tweaks in place, the above hypothetical and other lease transactions that are not cloud transactions properly fall outside the definition of a cloud transaction. In this form, the section 7701(e) factors may serve as a justification for the service contract designation, but they are unnecessary as a balancing test requisite for classification. In other words, it can be clearly stated that cloud computing transactions always constitute the provision of services because of the way they fit into the section 7701(e) framework—a cloud transaction under a more refined definition can be classified outright as a service. This simplification effectively and efficiently resolves the difficulties and ambiguities of a balancing test.

Importantly, the expansive and obscure definition in the Proposed Regulations is not a mere oversight of the Treasury. Rather, the definition was intentionally broadened to encompass other types of transactions, such as streaming services and database access.263 This expansion is unnecessary and conceptually incorrect.264 Every server that is used to deliver digital content to a customer is not properly characterized as a “cloud,” and every instance of on-demand network access is not a cloud computing transaction. The expansive definition captures transactions that have no business in the cloud realm, in an effort to capture transactions such as streaming services which in no way can be characterized as leases. It is this Article’s view that such transactions are separate in nature.

To be sure, a look into the ubiquitous streaming service that is Netflix makes clear that it is a cloud computing customer, rather than a cloud computing provider.265 The Netflix story is that of the model migration away from in-house datacenters and toward the massively scalable resources of cloud computing. In 2008, database corruption crippled Netflix-owned datacenters and left the streaming service searching for a third-party horizontally scalable solution.266 Netflix selected Amazon Web Services as their cloud provider and transitioned all client-facing services to the cloud.267 By 2016, Netflix was able to completely shut down their last remaining datacenters.268 Netflix notes several benefits obtained by this shift to the cloud: (1) scalability, as they simply would not have been able to scale their own datacenters quickly enough; (2) increase in service availability through increased reliability of Amazon’s massive global network; and (3) ultimately the cost reduction that comes with optimal elasticity and economies of scale.269 Therefore, Netflix is a cloud computing user rather than a cloud computing provider. It cannot be that simply

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258 Mell & Grance, supra note 9, at 2.
259 See Lizhe Wang et al., Cloud Computing: A Perspective Study, 28 NEW GENERATION COMPUTING 137, 139 (2010) (“Cloud computing is a set of network enabled services, providing scalability . . . ”); Vaquero et al., supra note 1, at 51 (“These resources can be dynamically reconfigured to adjust to variable load (scale), allowing also for an optimum resource utilization”).
260 Mell & Grance, supra note 9, at 2 (“Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate to demand”).
261 See id.; see also Foster et al., supra note 1, at 1–2; Bhardwaj, supra note 27, at 60–61; Vaquero, supra note 1, at 51.
262 Mell & Grance, supra note 9, at 2.
263 See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40319.
265 Izrailvsky et al., supra note 265.
266 Id.
267 Id.
268 Id.
269 See id.
being a customer of a cloud provider makes a streaming service one under the cloud rules. It also cannot be the case that mere access to content that is stored in a datacenter should be treated in the same way as true cloud computing transaction.\textsuperscript{270}

But, there is again a simple solution. The Treasury must say what it means by properly defining the digital content transactions it wishes to capture and denoting those transactions as service contracts. For example, if Treasury wishes to capture streaming transactions in the Proposed Regulations, “streaming” will be defined as the real time continuous transmission of audio or video files from a remote server to a client.\textsuperscript{271} Just as with cloud computing, streaming, by definition, is a service.\textsuperscript{272}

VIII. CONCLUSION

Cloud computing has eliminated the need for internet service providers, application developers, and organizations to purchase and maintain the hardware necessary to support their needs. As this attractive third-party model has increased in popularity, those who operate in the cloud require clarification as to how cloud computing transactions are classified. The Proposed Regulations move to answer the classification question by applying section 7701(c) factors, supplemented with additional unique factors, to cloud computing transactions. The cloud definition in the Proposed Regulations attempts to broaden the term far beyond its technical definition to capture additional non-cloud computing transactions.\textsuperscript{273} This captures transactions that do not fall within the cloud family and requires the application of a nine-factor balancing test to transactions that clearly fall within the “services” classification.

For this reason, the Proposed Regulations must tailor the “cloud transaction” definition to capture only cloud computing transactions by including language of scalability and network resource pooling. Transactions properly defined under the cloud computing heading will always be service contracts, as will transactions properly defined as streaming transactions. By simply defining these terms and labeling them as services, the Treasury can avoid confusion while consistently producing the correct classification result.

\textsuperscript{270} ALEXANDER WEISSER, INTERNATIONAL TAXATION OF CLOUD COMPUTING: PERMANENT ESTABLISHMENT, TREAY CHARACTERIZATION, AND TRANSFER PRICING 5, 13-17 (2020).


\textsuperscript{272} See Classification of Cloud Transactions and Transactions Involving Digital Content, supra note 22, at 40326 (applying the nine factors makes clear that a streaming transaction cannot garner enough factors to weigh in favor of a lease).

\textsuperscript{273} Id. at 40319.