TAXPAYER INFORMATION RULING LR10-007

March 24, 2010

The Department issues this taxpayer information ruling in response to your request of June 3, 2009, supplemented by your response of July 29, submitted on behalf of unnamed client. You request a determination of the applicability of Arizona transaction privilege tax to the Company's business activities of providing hosted software.

Statement of Facts:

Your June 3 request provides the following excerpted facts:

> The Taxpayer is entering into a licensing agreement to provide mainframe and midrange software to a Licensee which is domiciled outside Arizona. The Licensee will install mainframe software at a data processing center located in Arizona. The midrange software is installed on a distributed basis worldwide. Both mainframe and distributed software are used by the Licensee to provide data processing outsourcing services to its Client or Clients. The software license is negotiated and priced separately by product. . . .
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> . . . .
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> Taxpayer is licensing software to Licensee under the provisions of a Global Framework Agreement ("GFA") and a Participation Agreement ("PA") . . . . While the GFA is global in nature, the PA applies to a specific territory in which the software products are being used. In addition, transaction documents are issued for each license.
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> Following are the relevant sections of the GFA:
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> Section 3.1 of the GFA states:
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> *3.1 Grant of License to Licensee.*
> *This Agreement grants Licensee a nonexclusive, nontransferable worldwide license to access, use, execute, reproduce, display, perform, relocate and transfer among CPUs wherever located, the Software Products for (i) the internal use by Licensee, and (ii) to provide Client Services. No Client or any other person or entity (other than Licensee) shall be considered as the licensee hereunder for any purpose. These license grants become effective for a particular Territory when the Parties sign a valid Participation Agreement for that Territory.*
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> In that same section, the Licensee is limited to having a separate software license for each Client it serves unless otherwise agreed by Taxpayer.
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> Section 3.2 of the GFA further states:

3.2 Grant of License to Clients.
Clients may use, execute or have access to the Software Products pursuant to this Agreement. Licensee may use and execute such Software Products on Clients' behalf, but in any event, only to the extent (and no further) that such use or access is an integral part of Client Services. Any other access to or use of the Software Products by a Client including but not limited to third party use, third party training, facilities management, time-sharing, or use for any Client that acts as an application service provider, outsourcer, or service bureau shall require that the Client obtain from Taxpayer a separate license permitting the Client to have such access to or use of such Software Products.

Section 3.5 of the GFA permits the Licensee to use the Software Products on any CPU in any Territory for which a Participation Agreement or other comparable license agreement is in effect regardless of CPU ownership, control or location.

Section 6.3.1 of the GFA authorizes Licensee to acquire additional licenses and receive capacity upgrades.

Section 15.1 of the GFA specifies that the Software Products are the proprietary property of Taxpayer or of third parties that authorize Taxpayer to license under the GFA, and title to the Software Products remains with Taxpayer or the third parties.

Under the terms of Section 12.3 of the GFA, Taxpayer is liable for the payment of applicable taxes absent an exemption certificate from the Licensee.

Payment for the license is comprised of a license fee, annual subscription fee and standard usage and maintenance fee ("UMF"). Hereinafter, these will be referred to collectively as license fees.

Licensee Operations

Licensee enters into agreements with Clients to provide strategic data processing outsourcing services and provides those services on a mainframe, midrange and end user basis.

The data centers enable Licensee to provide those data processing services and to provide access to programs and data center capabilities through computer and telecommunications equipment to its Clients. The data processing services and access are necessary to meet the Client's individual needs to examine, acquire, store and retrieve data electronically, as explained below.

Mainframe Level

The mainframe level operations include servers and software located in centralized data centers. Clients access the data centers from remote locations 24 hours per day, seven days per week to utilize the data center to perform their data processing operations. These include generating financial data, reports, and in some cases developing their own application software.

Midrange Level

At the midrange level, the servers communicate with the data center and Clients to run the data processing applications that are similar to and, at times, in concert with, the mainframe data centers. The midrange level servers are located at distributed locations worldwide, and the software for the midrange level is distributed to locations primarily outside of Arizona. The Client also accesses the distributed software from remote locations.

End User Level

The end user level of data processing provided is at the desktop level and is distributed to end user level employees of the Clients worldwide.

In all cases, Licensee works with Clients to determine the locations the data is being run from and delivered to in order to bill for the services delivered to each location. Licensee maintains detailed records of the locations from which the data center is accessed.

The Arizona Data Center and Related Software Uses

Licensee has a large data center in Arizona to support one Client with worldwide locations utilizing mainframe level data processing services. Licensed software is installed at the Arizona data center; however, the Client accesses the software from remote locations to perform its various data processing related operations.

Relative to the Arizona-based software, Licensee's records indicate approximately 75% of the data is run from, and delivered to, locations outside the state of Arizona.

In addition to the data center, Licensee maintains software on servers located at distributed sites that are not necessarily located in data centers for the Client. The distributed software is also prewritten software licensed by Licensee for the exclusive use and benefit of Client. Client accesses the software from remote locations, as in the case of the mainframe hosted data centers.

When Licensee licenses server software, it is delivered by Taxpayer as follows: (1) on physical media or electronically delivered directly to the server location; or (2) delivered to the data center either on media or electronically, then distributed by Licensee to server locations. The software is installed at some locations in Arizona, but is primarily installed at locations outside Arizona. Similarly, Client accesses the distributed servers from remote locations some of which are in Arizona.

For both mainframe level software and server software, Licensee enters into a license agreement with Taxpayer for an extended term of 5 years. The license is for Licensee's right to use the software for the exclusive use and benefit of Licensee's outsourcing Client, to the extent it allows such use or access as an integral part of Client's services. Taxpayer invoices and bills Licensee for the entire term of the agreement at the inception of the license and Licensee pays the total amount billed.

> Both the GFA and PA exist to support strategic outsourcing agreements. The transaction document contains the specific prices and term for the individual license. Under these agreements, each account has a separate transaction document, and each license is for the exclusive use and benefit of Licensee's Client, to the extent it allows such use or access as an integral part of Client's services.

Your Issues:

You raise the following issues in your request:[1]

1. Are the software licenses, hosted from the Arizona center or stored on Arizona servers and accessed from and used at remote locations, subject to Arizona transaction privilege tax or use tax? Would licenses of software installed at locations outside of Arizona be subject to transaction privilege tax if provided under the same GFA? If the licenses are taxable, are they taxable as leases of tangible personal property under the provisions of Arizona Revised Statutes ("A.R.S.") § 42-5071 or as retail sales of software under A.R.S. § 42-5061?

2. If the software licenses are determined to be taxable, would the entire cost of the licenses be subject to transaction privilege tax or use tax, or would only the portion of the license fees pertaining to usage of the software in Arizona be subject to transaction privilege tax or use tax?

3. If the software licenses are taxable leases of tangible personal property, are the license fees taxable over the lease term, even if paid at inception or renewal of the license?

Your Positions:

Taxpayer's positions are as follows:

1. Taxpayer is not subject to transaction privilege tax or use tax on the gross receipts it derives from license fees for its software products. Taxpayer is licensing software products to a Licensee that maintains one data center in Arizona and servers located worldwide that serve a particular Client or Licensee on an outsourced basis. The Client accesses the data center remotely for its own purposes, whether it is running reports or developing its own application software. The Client receives the benefit of the data processing services at locations around the world, with Arizona being a small part of that service base. If the overwhelming usage of the software occurs outside Arizona, none of the license fees should be subject to transaction privilege tax or use tax. Similarly, distributed software licensed to remote locations that is never in Arizona and software in the state temporarily for compatibility testing at the request of the

[1] The issues and positions that follow are paraphrased from the language used in your June 3 request.

remote user that is intended for use at a remote location outside the state should not be subject to transaction privilege tax or use tax.

Although the Department has taken different positions in previously issued private taxpayer rulings,[2] Taxpayer asserts that a license for use and a lease are not synonymous and, therefore, its transactions with Licensee cannot be leases of tangible personal property, citing *Energy Squared, Inc. v. Arizona Department of Revenue*[3] as support.

2. If Arizona-based software license fees are determined to be subject to transaction privilege tax or use tax, no more than 25 percent of those fees should be taxable. Distributed software licensed for use in remote locations and software intended for use in remote locations but temporarily in Arizona for compatibility testing should not be subject to transaction privilege tax or use tax.

3. If software license fees are determined to be subject to tax, the fees should be amortized over the term of the lease and transaction privilege tax paid accordingly. Amortization is allowed for income tax purposes, and Taxpayer uses a revenue recognition model under Generally Accepted Auditing Principles (GAAP) that allows revenue to be recognized over the service period proportionate to the services being provided and not when the advance payment is made. Because Taxpayer would not recognize the income for book purposes or for income tax purposes immediately, the same treatment should be accorded in the payment of transaction privilege tax.

Discussion:

Transaction Privilege Tax Imposed Under the Retail and Personal Property Rental Classifications

Products sold, leased, or rented as part of a business's taxable activities under the retail and personal property rental classifications are not limited to "physical goods," but rather, need only constitute "tangible personal property." Arizona's broad definition of tangible personal property is "personal property which may be seen, weighed, measured, felt or touched or is in any other manner perceptible to the senses."[4]

The tax base for the retail transaction privilege tax is limited to the gross receipts derived from the business of selling tangible personal property "at retail." Retail sales are those "for any purpose other than for resale in the regular course of business in the form of tangible personal property, *but transfer of possession, lease and rental as used in the definition of sale mean only such transactions as are found on investigation to be in lieu of sales as*

[2] Ariz. Private Taxpayer Rulings LR04-007 (Aug. 31, 2004), LR04-010 (Nov. 15, 2004), and LR09-001 (Feb. 3, 2009).
[3] 203 Ariz. 507, 56 P.3d 686 (Ct. App. 2002).
[4] A.R.S. 42-5001(16).

defined without the words lease or rental."[5] Transfers of possession, leases, and rentals are instead generally subject to transaction privilege tax under the personal property rental classification

The personal property rental classification comprises "the business of leasing or renting tangible personal property for a consideration."[6] While there are specific retail exemptions for professional or personal service occupations or businesses and for services rendered in addition to retail sales of tangible personal property, no corollaries exist under the personal property rental classification. Arizona Administrative Code ("A.A.C.") R15-5-1502(D) underscores this discrepancy between classifications in stating, "Gross income from the rental of tangible personal property includes charges for installation, labor, insurance, maintenance, repairs, pick-up, delivery, assembly, set-up, personal property taxes, and penalty fees even if these charges are billed as separate items, unless a specific statutory exemption, exclusion, or deduction applies."

The taxability of a vendor's gross receipts derived from any sale of tangible personal property (*i.e.*, sale at retail, lease, or rental) made under the retail and personal property rental classifications is unaffected by whether the vendor's customers allow subsequent use of that property by parties other than the users licensed by the vendor. Under such circumstances, the only means by which taxability would be impacted is if: (a) vendor delivers the tangible personal property to purchasers or lessees for use exclusively outside the state or (b) the vendor's customers make subsequent retail sales or leases of the property, such that the initial transactions between the vendor and its customers constitute non-taxable sales for resale.[7]

While tax statutes relating the same subject must be read together and construed as a whole,[8] statutes providing for different subject matters should not be so read.[9] Moreover, "clear and unambiguous" statutory language is taken as conclusive "unless clear legislative intent to the contrary exists or impossible or absurd consequences would result."[10]

Taxpayer did not specify which method of reporting it has elected in its ruling request. The federal income tax treatment of a business's gross proceeds is not determinative of the timing of tax for transaction privilege tax purposes. Consequently, if a business elected to use the cash receipts method of reporting, it will report sales based on when payments are received, regardless of how the same business reports for income tax purposes.

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[5] A.R.S. § 42-5061(V)(3) (emphasis added).
[6] A.R.S. § 42-5071(A).
[7] *See* A.R.S. §§ 42-5061(V)(3) (taxable activity of "selling at retail" excludes selling for resale) and 42-5071(C) (sales of tangible personal property to be leased or rented to a person engaged in a leasing or rental business are deemed sales for resale).
[8] *Bassett v. City of Tucson*, 137 Ariz. 199, 669 P.2d 976 (Ct. App. 1983); *Rio Rico Props., Inc. v. Santa Cruz County*, 172 Ariz. 80, 834 P.2d 166 (Tax Ct. 1992); *see also Cicoria v. Cole*, 222 Ariz. 428, 215 P.3d 402 (Ct. App. 2009) (statutes relating to the same subject or have the same general purpose should be read in connection with, or construed together with other related statutes as if they constituted one law).
[9] *RCJ Corp. v. Ariz. Dep't of Revenue*, 168 Ariz. 328, 812 P.2d 1146 (Tax Ct. 1991).
[10] *Premiere RV & Mini Storage LLC v. Maricopa County*, 222 Ariz. 440, 215 P.3d 1121, 1125 (Ct. App. 2009); *Paging Network of Ariz., Inc. v. Ariz. Dep't of Revenue*, 193 Ariz. 96, 97, 970 P.2d 450, 451 (Ct. App. 1998).

As a matter of general reporting and payment of transaction privilege tax, A.A.C. R15-5-2211 provides:

> A. For purposes of this Section, the following definitions:
> 1. "Accrual method" means that a sale is reported in the reporting period in which the sale occurs regardless of when payment is received.
> 2. "Cash receipts method" means that a sale is reported in the reporting period in which payment is received.
> 3. "Method of reporting" means a method to report and pay transaction privilege tax.
> 4. "Payment" means all consideration received including cash, credit, property, and services.
> 5. "Reporting period" means a calendar month or as prescribed by A.R.S. § 42-5014.
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> B. A taxpayer shall elect a method of reporting based on either the accrual or the cash receipts method at the time of making the application for a transaction privilege tax license or use tax registration.
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> C. A taxpayer shall report allowable exclusions, deductions, and exemptions in a manner consistent with the method of reporting elected under subsection (B).
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> D. A taxpayer shall provide written notification to the Department prior to changing its method of reporting elected under subsection (B). The Department may audit the books of the taxpayer to adjust any tax liability resulting from the change in the method of reporting.

Hosted Software Applications[11]

Under the traditional model, prewritten (canned) software has been sold at retail as "shrink-wrap" or "click-wrap" licenses, wherein a customer buys a license from a software producer or third-party retailer to use the software and installs it locally (*e.g.*, from a CD-ROM or electronically-transferred package of files) on hardware belonging to or under the control of the customer; the software producer may subsequently provide support to the customer as dictated by the software license agreement or a separate software support agreement.[12] The Software-as-a-Service (SaaS) model of software delivery to consumers is one in which a vendor hosts the application software (*i.e.*, stores the software application code on the vendor's servers or servers owned by a third party remote from the customers' premises), and customers access them over a network, typically the Internet using a web-based user

[11] To provide a frame of reference for this subsection, a discussion of basic principles of computer hardware and software concepts can be found in the Appendix to this private taxpayer ruling.

[12] *See, e.g.*, Frederick Chong & Gianpaolo Carraro, *Building Distributed Applications: Architecture Strategies for Catching the Long Tail*, MICROSOFT DEVELOPER NETWORK, Apr. 2006, http://msdn.microsoft.com; H. WARD CLASSEN, SOFTWARE LICENSING FOR LICENSEES AND LICENSORS 199-200 (3d ed. 2009).

interface.[13] Customers do not own the software licenses but, rather, pay on a subscription basis (*e.g.*, on a per-application or usage basis) for using them.[14]

"Cloud" (*i.e.*, Internet-based) computing often involves, as a component, a "cloud application," one which exists partially or fully online. One example is the SaaS application described above, wherein software is not installed and run locally, reducing the need for localized software maintenance, deployment, management, and support.[15] Because such offerings are typically subscription-based, they reduce or amortize the immediate front-end costs that are commonly associated with acquiring prewritten software licenses (*e.g.*, software and hardware costs, technical support, update fees, time to install and manage software).[16] Another example is a Software plus Services ("S+S") model, a hybrid between traditional application development and SaaS wherein "rich client" applications are installed locally on a user's personal computer as an interface to externally hosted applications.[17] Such offerings may be provided directly from a vendor or by a third-party intermediary called an aggregator, which bundles SaaS offerings from different vendors and offers them as a single package.[18]

The term "license," as used in the retail software sale context, has been described as "something of a technicality" because "legally, the customer is only purchasing the right to use a copy of the software, but for practical purposes, it's as though the customer 'owns' the software and may use it as often and for as long as it wishes."[19] In fact, a typical retail sale of prewritten software at a brick-and-mortar location is a sale of the medium on which the copyrighted work is fixed, with a purchaser obtaining a perpetual, nonexclusive license to certain rights inherent in the work in conjunction with the sale.[20] Contrastingly, with an SaaS model, "instead of 'owning' important software outright, customers are told, they can

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[13] R. KELLY RAINER JR. & EFRAIM TURBAN, INTRODUCTION TO INFORMATION SYSTEMS 358 (2009); Chong & Carraro, *supra* note 12; CLASSEN, *supra* note 12, at 143 (use of a third parties to manage and maintain software under "managed hosting" model). It has been observed that, from a terminology standpoint, "SaaS has superseded Application Service Provider (ASP) and "Utility Computing" as the industry's preferred name for purchasing software on a service basis." CLASSEN, supra note 12, at 143.

[14] RAINER & TURBAN, *supra* note 13, at 358; Gianpaolo Carraro & Fred Chong, *Software as a Service (SaaS): An Enterprise Perspective*, MICROSOFT DEVELOPER NETWORK, Oct. 2006, http://msdn.microsoft.com; Chong & Carraro, *supra* note 12; CLASSEN, *supra* note 12, at 144. Note that, although the focus of the discussion is on the managed hosting model, wherein third parties are responsible for managing and maintaining customers' hardware and software, there are also "collocation" models where customers own all hardware and software and the third party merely provides a space, power, Internet connection, and basic monitoring ("power, pipe, and ping"). *See* CLASSEN, *supra* note 12, at 147.

[15] Darry Chantry, *Mapping Applications to the Cloud*, MICROSOFT DEVELOPER NETWORK, Jan. 2009, http://msdn.microsoft.com; CLASSEN, *supra* note 12, at 143-44.

[16] CLASSEN, *supra* note 12, at 28, 143-44.

[17] Chantry, *supra* note 15.

[18] *See* Carraro & Chong, *supra* note 14. This article also discusses the varying degrees to which programs can be partially or wholly reliant on SaaS-based architecture in usage (*e.g.*, when locally-run software depends in part on data produced by a SaaS application).

[19] Chong & Carraro, *supra* note 12. Such software is commonly known as "shrink-wrapped" software in the industry.

[20] CLASSEN, *supra* note 12, at 19, 23-24.

pay for a subscription to software running on someone else's servers, software that goes away if they stop subscribing."[21]

An important reason that mass-marketed prewritten software has traditionally been distributed by license rather than outright sale arises from copyright concerns under the "First Sale Doctrine," which provides that an individual who purchases an authorized copy of a work may use and resell that copy free of restraint by the copyright owner.[22] The federal Copyright Act[23] statutorily protects software developers in the following three ways:

1. Adaptations or derivative works cannot be transferred by purchasers without the permission of the copyright owner.
2. The purchaser may make an archival copy or any adaptation of the software essential to use of the original, but such copy or adaptation may only be transferred as part of the lease, sale, or other transfer of rights in the underlying program. Copies authorized to be made may be transferred only as part of a transfer of all rights in the underlying program (e.g., the distribution right conveyed to the purchaser does not include a right to make further copies for resale).
3. Software purchasers cannot lend, lease, or rent copies of software (including any tape, disk, or other medium embodying the program) to third parties without authorization from the copyright owner.[24]

The intuitively understood benefits of the cloud computing business model have been summarized in the following fashion:

> By eliminating much of the upkeep, and using the economics of scale to combine and centralize customers' hardware and services requirements, SaaS vendors can offer solutions at a much lower cost than traditional vendors, not only in monetary terms, but also by greatly reducing the need for customers to add complexity to their IT infrastructure. This gives SaaS exclusive access to an entirely new range of potential customers that have always been inaccessible to traditional solution vendors, because it has never before been cost-effective to serve them . . . .[25]

In instances where software vendors offer cloud computing offerings, programs are often reconfigured to meet certain end-user needs; such activities are distinguishable from actual software customization, in that vendors will reconfigure the software's metadata to change the way an application appears and behaves for a particular customer.[26] Cloud computing

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[21] *Id.* at 23-24; Chong & Carraro, *supra* note 12.
[22] CLASSEN, *supra* note 12, at 16-17.
[23] 17 U.S.C. § 101 et seq.
[24] 17 U.S.C. §§ 107, 109(b), 117; *see also* CLASSEN, *supra* note 12, at 17-18.
[25] Chong & Carraro, *supra* note 12.
[26] *See, e.g.*, *id*. The term "metadata" is often defined as "a definition or description of data," wherein users or information systems professionals can configure how data is displayed or otherwise manipulated for end users without any change in the software code base. *See id.*; Dick O'Meara & Beverly Reeder, *Meta*, SEARCHSQLSERVER.COM, Nov. 7, 2005, http://serachsqlserver.techtarget.com.

users may use browser or rich Internet application (*e.g.*, thin client client-server model applications) as a kind of gateway or interface to allow them to access the applications.[27]

For purposes of Arizona transaction privilege tax, the Department does not consider a license of tangible personal property the same as a taxable lease or rental. A software license, however, is dissimilar to arrangements that fall under the general "license" nomenclature used for leases and rentals of physical tangible personal property (*e.g.*, property that can be touched or felt). As discussed, virtually all sales of prewritten software are sales of nonexclusive rights to use, regardless of whether they are sold on physical media or transmitted electronically or whether they have perpetual or limited terms.[28] Because of the interplay of federal copyright laws and the differences in the meaning of the terms "sale" and "license" as used in the Copyright Act compared to common law applications used in Arizona tax law cases,[29] a software license should not be confused with the common law concept of license. Tax treatment is based upon the rights that arise from a particular contractual arrangement; merely relying on how the arrangement is labeled can be misleading.

Ruling:

Based on the facts and documentation provided, the Department rules as follows:

1. Taxpayer is engaged in the business of leasing software, and is thus subject to tax under the A.R.S. § 42-5071 personal property rental classification on the gross receipts it derives from activities associated with leases to an Arizona customer. Taxpayer's gross receipts derived from software leased to out-of-state lessees, to out-of-state persons (e.g., using the software exclusively outside the state, or to persons leasing for resale or re-lease are deductible under A.R.S. § 42-5071. Under any other circumstances, the taxability of Taxpayer's leases to Arizona customers is unaffected by whether such customers allow subsequent use of the property by parties other than the users specifically licensed by Taxpayer. Clients' scope of use of Taxpayer's software offerings does not appear to vary from the localized levels of manipulation and use by clients' CPUs that are standard with any application software, with the only remote aspect being the secondary storage locations of the prewritten software.

2. Taxpayer is subject to tax on the entire amount of its gross receipts for software licenses leased to Arizona licensees. As noted above, the taxability of these gross receipts is unaffected by whether the licensees allow subsequent use of the property by parties other than the users specifically licensed by Taxpayer.

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[27] Carraro & Chong, *supra* note 14. For more discussion of rich Internet applications, *see Rich Internet Application (RIA*), SEARCHSOA.COM, Sept. 25, 2007, http://searchsoa.techtarget.com; Kathy Chung et al., *Thin Client*, SEARCHNETWORKING.COM, Mar. 23, 2006, http://searchnetworking.techtarget.com; Thomas Li, *Application Program Interface*, MICROSOFT EXCHANGE, Feb. 16, 2004, http://searchexchange.techtarget.com.

[28] For additional discussion on the rare occasions that exclusive software licenses are sold, *see* CLASSEN, *supra* note 12, at 27.

[29] *See, e.g.*, *id.* at 19.

3. Taxpayer's reporting of gross receipts derived from its taxable leases of software licenses and remittance of applicable transaction privilege tax depend solely on the particular method of reporting it has elected with the Department, pursuant to A.A.C. R15-5-2211.

This private taxpayer ruling does not extend beyond the facts presented in your letters and enclosed documents of June 3 and July 29, 2009.

This response is a taxpayer information ruling (TIR) and the determination herein is based solely on the facts provided in your request. The determinations are subject to change should the facts prove to be different on audit. If it is determined that undisclosed facts were substantial or material to the Department's making of an accurate determination, this taxpayer information ruling shall be null and void. Further, the determination is subject to future change depending on changes in statutes, administrative rules, case law, or notification of a different Department position.

If the Department is provided with required taxpayer identifying information and taxpayer representative authorization before the proposed publication date (for a published TIR) or date specified by the Department (for an unpublished TIR), the TIR will be binding on the Department with respect to the taxpayer that requested the ruling. In addition, the ruling will apply only to transactions that occur or tax liabilities that accrue from and after the date the taxpayer receives the ruling. The ruling may not be relied upon, cited, or introduced into evidence in any proceeding by a taxpayer other than the taxpayer who has received the taxpayer information ruling. If the required information is not provided by the specified date, the taxpayer information ruling is non-binding for the purpose of abating interest, penalty or tax.

Appendix: How Computer Systems Use and Store Computer Software

"Computer hardware" generally refers to the physical equipment used for input, processing, output, and storage activities of a computer system's architecture. Computer hardware falls into one of six general categories:

- the *central processing unit* ("CPU"), which manipulates data provided to it locally to the user, controlling the tasks performed by the other components of the computer system;

- *primary storage*, which temporarily stores data and program instructions during processing;

- *secondary storage*, which stores data and programs externally from the CPU for future use;

- *input technologies*, which accept data and instructions and convert them to a form that the computer can understand (*e.g.*, keyboards, mice, webcams, barcode scanners);

- *output technologies*, which present data and information in a format that people can readily understand (*e.g.*, monitors, printers); or

- *communication technologies*, which provide for the flow of data from external computer networks (*e.g.*, the Internet, intranets) to the CPU, and from the CPU to computer networks.[30]

Function of Computer Software Programs

At base, a computer is only capable of executing instructions that someone or something provides to it. The CPU (also informally known as the computer "chip") is a microprocessor that performs the actual computation inside a computer (*i.e.*, accesses instructions, decodes them, performs mathematic calculations and logical comparisons, controls the data flow to various parts of the computer, and stores very small amounts of data and instructions for short periods of time).[31] This process is also known as the "stored program concept," wherein software programs are accessed and their instructions are executed—followed—in the CPU.[32]

In the CPU, inputs enter and are stored until needed, at which point the input is retrieved and processed, and the output is stored and delivered somewhere. Inputs are made up of data and brief instructions (coming to the CPU from other parts of the computer, such as the keyboard or read from a data file stored somewhere else) about what to do with the data. CPUs can only process binary data (*i.e.*, 0s and 1s), so all information is translated in

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[30] *See, e.g.,* R. KELLY RAINER JR. & EFRAIM TURBAN, INTRODUCTION TO INFORMATION SYSTEMS 326, 340-41 (2009).

[31] *Id.* at 326-27. Such microprocessors are also found in other devices such as television sets, cellular telephones, and automobile sensors. *Id.* at 328-29.

[32] *Id.* at 350.

the CPU to this language. (The 0s and 1s are later translated into building-block "bits" of data, combinations of which correspond to alphanumeric characters or mathematical operations, through computer languages.) After the CPU processes the input data, the output goes to other parts of the computer (*e.g.*, storage or computer monitor) while the original input data and instructions go back to the storage places they came from (*e.g.*, hard drive). This process is called the "machine instruction cycle" and currently can occur billions of times a second.[33]

Primary and Secondary Memory Storage

A computer's primary memory storage is typically located on chips mounted to the computer's main circuit board, known as the motherboard. Primary storage is so called because it stores small amounts of data and information that will be used immediately by the CPU. Three types of information are stored in these brief periods: (1) data that the CPU will process, (2) instructions telling the CPU how to process the data, and (3) operating system programs that manage different aspects of the computer's operation. All this information has been translated into binary code.[34]

The four categories of primary storage are register, random access memory ("RAM"), cache memory, and read-only memory ("ROM"). RAM is what holds a software program and small amounts of data for processing—when you run an application on your computer (*e.g.*, a word-processing program), the whole program is transported to RAM from secondary storage, from which point it will move to the CPU. RAM is temporary and will generally lose its contents when the electrical current is lost or turned off (this is the data that a computer user typically loses in a "crash" or power failure).[35]

ROM chips are where certain critical instructions are safeguarded in the event of RAM data loss, such that instructions are retained even when the power to the computer is turned off. The "read-only" designation is given to this type of primary storage because the information stored there can only be read by the computer and is not typically changeable by users; examples include instructions the computer needs to start or "boot" itself.[36]

A computer's secondary storage keeps much larger amounts of data and information than primary storage (*e.g.*, an entire application) for often indefinite periods of time.[37] Examples of secondary storage are magnetic media storage (*e.g.*, tape storage systems, hard drives), optical storage (*e.g.*, compact disk read-only memory (CD-ROM) and digital video disk (DVD)), and flash memory (*e.g.*, memory sticks, memory cards).[38] Businesses often use these storage devices as enterprise storage systems, which include two or more storage

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[33] *Id.* at 327-29.
[34] *Id.* at 329-30.
[35] *Id.* at 330, 331. Magnetic RAM is an example of primary storage that does not share the volatility of traditional RAM. *Id.* at 331.
[36] *Id*.
[37] *Id.* at 329.
[38] *Id.* at 330, 332-34.

devices to obtain large amounts of storage capacity, protect against data loss, allow fast and reliable access to data among devices, and better manage and monitor data.[39]

Systems Software and Application Software

There are two major categories of software that computers utilize: systems software and application software. Systems software are instructions that primarily work as an intermediary between hardware and application software, regulating computer systems by loading itself when power to a computer is first turned on and providing commonly used sets of instructions for all applications.[40] Application software consists of instructions that provide specific functionality to a computer user (*e.g.*, word processing, spreadsheets, presentation, graphics editing).[41]

[39] *Id.* at 334-35. For an overview on the ways data moves among sources in a Software-as-a-Service model, as well as how various applications can be merged in a "seamless" composite application, *see* Gianpaolo Carraro & Fred Chong, *Software as a Service (SaaS): An Enterprise Perspective*, MICROSOFT DEVELOPER NETWORK, Oct. 2006.
[40] RAINER & TURBAN, *supra* note 30, at 350.
[41] *Id.* at 350-51, 354.