Augmenting Traditional Accounting Analysis and Design Methods With The Business Rules Modeling Paradigm: A Framework And An Accounting For Leases Illustration

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Abstract

At first glance, it might not be obvious why accountants should be concerned with the analysis and design phases of systems development. To some, systems analysis and design might be the concern of just the systems people. This is just not true. Accountants have a stake in robust, complete, correctly functioning accounting systems where high levels of reliance can be placed on the system outputs. Accounting systems are often unique in that they are so complex. This necessitates that accountants must be involved in the systems development process and understand some basic analysis and design techniques. Though numerous analysis and design methods exist, business rules are unique in that they can be understood by non-systems persons. Business rules can also be integrated with other analysis and design methods to build more complete, robust models of accounting systems. Business rules are also used to provide insurance that all facets of a system are addressed. Frequently, some portion of an accounting system "falls through the cracks" until some later point in the system development life cycle. This can be a significant problem because either the design must be reworked or the omitted portion must be created as an "afterthought add on." Either method is costly, so avoiding missing portions of a system is paramount.

Introduction

The analysis and design phases of the systems development life cycle continue to be critical in the overall success of a systems development project. A number of paradigms have been developed to aid in

the analysis and design process including entity/relationship modeling, data-flow diagrams, object-oriented modeling, semantic data modeling, business rules, etc. In many ways, the analysis and design phases are more critical in the accounting systems area because of the complexities of so many accounting treatments. For example, accounting for pensions, leases, and

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derivatives is so complex that many experts must be called upon to build correctly functioning systems. A poorly completed analysis and design of a lease accounting system would likely be disastrous for an organization with consequences ranging from a failed audit to litigation for fraud.

This paper demonstrates the power of the analysis and design methodology business rules by demonstrating the case of accounting for leases. It is also an illustration that can be used to help accounting systems developers apply the business rules methodology in other accounting systems efforts.

This paper proceeds in Section II with a review of some common analysis and design methodologies and a review of the business rules paradigm in Section III. Section IV includes a review of the important elements of accounting for leases while Section V illustrates integrating accounting for leases with the business rules paradigm. Section VI includes a discussion of the contributions of this paper and a conclusion.

Analysis And Design Methodologies

The analysis and design phases of the systems development process are critical to the success of any accounting system. The goals of the analysis and design phase are to develop better systems, produce better documentation, complete systems more quickly, manage complexity, and improve the ability to estimate development costs. In the early 1970's, several analysis and design approaches emerged that attempted to apply engineering principles to software and systems development. As methodologies became formalized, automated tools such as computer-aided software engineering (CASE) tools became popular. In the following paragraphs, several popular analysis and design methods are briefly reviewed, and introduce a framework introduced that is useful in examining these methods. The analysis and design methods are categorized as process-oriented, data-oriented, and object-oriented.

Process orientation

Process-oriented analysis and design methods are sometimes referred to as "structured" analysis and design methods. Variations of structured analysis and design methods emerged under the names of their creators: DeMarco (1978), Yourdon and Constantine (1978), and Gane and Sarson (1979). Each method involves a number of phases, which, when properly completed, yield a well-designed software system. Although the number of phases varies depending on which method is followed, all of the methods involve at least the following four major divisions.

The first phase includes the identification of the problem to be solved, an initial feasibility analysis, and estimates of time and other resources required to complete the proposed project.

The second phase includes a detailed analysis of the existing system. The data flow diagram is a very common method of illustrating an existing system.

The third phase is the detailed design of the new system. Data flow diagrams, structure charts, and the data dictionary are a few of the tools that are frequently used in this phase. A comprehensive, detailed system specification is produced in the design phase.

The design is used to produce an actual, working system in the fourth phase. Programs are written and tested, the system is installed, and adjustments are made according to users' comments. One of the most important, but perhaps least well known, tools used in the development phase of the systems analysis and design process is the database data dictionary. Also called the central repository, this tool allows developers to maintain standard data and process definitions. Other tools, such as the data flow diagram, are more widely known because they are so closely associated with the process-

oriented approach to systems development.

A data flow diagram (DFD) models the process(es) by which incoming data are manipulated and transformed to become output. Emphasis is placed on the flow of data through and among processes that comprise the system. Although the DFD may represent physical movement of data, the main purpose of the diagram is to represent conceptually how the data moves from one process to another. During system analysis, analysts create a DFD to make a conceptual "map" of the existing system. Often, the simple act of creating a DFD reveals inconsistencies and inefficiencies in the existing system. During system design the analyst uses a DFD to

show how the new system will overcome the problems found in the old system. An example of a simple DFD is shown in Figure 1 (below).

Our DFD example is based on derivation No. 3 in Appendix C (discussed later). The arrows in Figure 1 represent data moving among the processes, which are represented by round-cornered boxes. The processes are numbered for identification purposes and do not represent sequential processing order. For example, a piece of data called "sum of payments," which is produced by process P2 (sum payments), enters process P1 (calculate present value) and is transformed by P1 into a new piece of data called "present value of payments." Process P3 takes

“sum of payments” and “present value of payments” as inputs to produce the data item called “interest amount,” which becomes input to yet another process, etc. It is important to note that the processes are carefully named as processes and not as the people who perform them (Bob) or as the place where they are performed (Bob’s desk). DFD’s may be produced at any level of abstraction or detail.

Data Orientation

Whereas the goal of process-oriented methods seems to be creating a set of programs to execute necessary processes, the goal of data orientation is simply to create a database. A popular analysis and design methodology with a data orientation is the entity-relationship (ER) method (Chen, 1976). An entity-relationship (ER) diagram depicts entities (e.g., products, customers, accounts, and employees) and the relationships that link them together. For exam-

ple, two entities might be the salesperson and the products. The relationship between the salesperson and the products would be a *sale*. Simply stated, a salesperson sells a product.

Attributes of each entity that are important to the system, such as ID-NUMBER and BILLING-ADDRESS for an entity called Customer, are added to the model, along with notations on cardinality of relationships (one-to-one; one-to-many; many-to-many). A completed ER diagram serves as the starting point for the creation of relational database tables.

An example ER diagram is shown in Figure 2 (below) illustrating that a lessor leases property to a lessee. Each round-cornered box represents an entity. The lines connecting the boxes represent the relationships among the entities, as shown in the diamond shapes. An ER diagram can also show *cardinality*, which in this case, means that one lessor may lease zero to

many properties, and each property may be leased by one and only one lessor. The ER diagram also indicates that one lessee may use zero to many properties, and each property is used by one and only one lessee.

Various attributes of each entity are recorded in the data dictionary, e.g., lessee's name and address, and may or may not be shown on the ER diagram. In data-oriented design, the entities, with their attributes and relationships, are precursors to database tables, which contain the same attributes and relationships.

Another data-oriented approach which is geared more specifically toward accounting is the REA (resources, events, agents) accounting model. Although the REA model has some similarities to the ER model, the REA model starts from a different set of basic assumptions and uses a different vocabulary. For example, the ER model might depict an account called Cost of Goods Sold as an entity. The REA model would depict the same account as an attribute of a set of "sale events."

Object Orientation

Because object modeling is closely related to data modeling, considering the object modeling approach separately might be consid-

ered arbitrary and unnecessary. However, the recent popularity of object-oriented system development causes this approach to stand out. Booch defined in 1991 three related phases of object-oriented system development: (1) Object-oriented analysis is a method of analysis that examines requirements from the perspective of the classes and objects found in the vocabulary of the problem domain; (2) Object-oriented design is a method of design encompassing the process of object-oriented decomposition and a notation for depicting both logical and physical as well as static and dynamic models of the system under design; and (3) Object-oriented programming is a method of implementation in which programs are organized as cooperative collections of objects, each of which represents an instance of some class, and whose classes are all members of a hierarchy of classes united via inheritance relationships.

The major conceptual elements of the object model are abstraction, encapsulation, modularity, and hierarchy. Table 1 includes definitions of some important object-oriented modeling concepts.

Other Modeling Approaches

None of the approaches previously described is perfect in the sense that all situations

Table 1
Object-Oriented Modeling Concepts

Term	Description
Objects	Any real-world entity which is associated with a system-wide unique identifier. Also includes method and class definition objects.
Class	All objects which share the same set of attributes and methods may be grouped into a class. An object belongs to only one class as an instance of that class.
Attributes	An object has one or more attributes. The value of an attribute of an object is also an object.
Inheritance	Corresponds to the semantic modeling notion of generalization and specialization. Methods and class definitions can be inherited.
Encapsulation	Provides data independence through the implementation of methods, allowing the private portion of an object to be changed without affecting programs that use that object type.

can be modeled with grace and ease. Theorists and practitioners have strived to improve existing methods, and information systems innovations have been applied to enhance and update them. Prominent among these efforts is CASE (computer aided software engineering). For practical purposes, CASE may be simply defined as the automation of system development processes. Various commercial software products have been marketed which provide for the generation of DFDs, ER diagrams, Data Dictionaries, etc. in a consistent and integrated way.

Additional popular approaches include prototyping, Rapid Application Development (RAD) and Joint Application Development (JAD). The major goal of all these approaches is to reduce the time required to develop systems as well as to improve the quality of the finished product.

A Simple Model

The system development methods described above are not to be considered as mutually exclusive. That is, use of one method does not preclude application of another method in the same project. Indeed, most real-world information system development projects employ multiple methods. The simple model in Figure 3 illustrates the idea that the tools of each method may contribute to the development of an information system, and their contributions may occur in parallel as well as serially. Simultaneously, a data dictionary or central repository is developed where all data items, processes, and other entities related to the system are defined and described. Thus, while the system is developed, possibly via a combination of several methods, all components of the system are documented in one central and standardized resource.

In Figure 4 the Business Rules Paradigm is added to the model. This illustrates that the business rules paradigm does not supplant a particular development approach, but rather

augments whichever approach or combination of approaches the developers may choose. The tools of each method still make a valuable contribution to system development, and the methods are "linked" by the common repository or data dictionary. Business rules provide added value because they are intended to be a communication methodology that can bring together the goals of the business managers and the data administrators (Von Halle, 1997).

Business Rules Reviewed

In many business organizations, managers and data administrators often struggle to understand each other's areas. Additionally, data administrators are often unaware of business processes and the critical aspects of the business. Data modeling and the conceptual design process are intended to enable these two groups to communicate more effectively. Some design and modeling paradigms include E/R modeling, the REA model, semantic modeling, object-oriented data models, etc. Many of these models are excellent at specific phases of the analysis and design process, but each seems to lack the ability to fully illustrate the business processes so that effective communication between data administrators and business managers can occur.

A business rule is defined as "a statement that defines or constrains some aspect of business" (Von Halle, 1997). It is further stated that "business rules must relate in obvious ways to important aspects of the business, specifically, business knowledge and behavior" (Von Halle, 1997). The concept of the "business rule" was identified to represent a communication methodology that can bring the goals of business managers and data administrators together (Von Halle, 1997). Business rules allow data administrators to translate the identified needs of the business managers into a form that can be modeled and later implemented into the system.

There are four categories of business rules: definitions, facts, constraints, and deriva-

tions (Von Halle, 1997). *Definitions* are used to delineate different aspects of the business (Von Halle, 1997). For example, a definition of a capital lease could be "a rental agreement that represents, in substance, the purchase of an asset and the incurrence of a liability." A *fact* is a property or role of an object or a relationship that an object has with another object (Von Halle, 1994). An example of a fact from FASB No. 13 would be "A lease that transfers substantially all of the benefits and risks incident to the ownership of property should be accounted for as the acquisition of an asset and the incurrence of an obligation by the lessee." A *constraint* is a condition about the data that must be true" (Von Halle, 1997). For example, a constraint could be "if a lease is treated as a sale, the lessor should record a sale of the property and recognize a receivable for the future rent." Finally, a *derivation* is a business rule that is computable from existing information (Von Halle, 1997). An example of a derivation would be "the difference between the cost of the property on the books of the lessor and the fair value of the property is recorded as gross profit (loss) on the sale at that time."

Identifying business rules begins with natural language statements made by business management (members of the business not involved with data administration). These statements are termed "business ramblings" (Von Halle, 1994). Business ramblings can be very structured and easy to understand, or they can be a jumble of facts and ideas. The duty of the data administrator is to record the business

ramblings so that they can be used to identify business rules. It is usually preferable to gather these business ramblings from multiple sources so that a degree of assurance is achieved concerning the accuracy of the ramblings. The recorded business ramblings are broken down at some point into "atomic units" (Von Halle, 1994). An atomic unit is a statement that cannot be broken down without losing its meaning (Von Halle, 1994). Atomic units are then used to create a model that eventually will implement the business rules into the accounting system.

By identifying a methodology that data administrators can follow to capture business rules, a line of communication is opened between business managers and data administrators. This occurrence is very important, as businesses increasingly rely on information technology to assist in data retrieval, decision making, and business projections. For an information system to assist in a business's success, it is imperative that data administrators understand the goals and requirements of the business. This understanding will give data administrators the ability to design the optimal system for their company.

Leases Reviewed

Many organizations choose to lease assets instead of purchasing them, for a variety of reasons. First, assets may be leased to reduce the risk of ownership. If a manufacturing organization chooses to lease some crucial, high-risk equipment and the equipment breaks down, usually the owner of the equipment is responsible for the repair. Second, an organization may choose to lease in order to improve cash flows. Third, leases are sometimes used for so-called "off-balance-sheet financing." Off-balance-sheet-financing can improve financial ratios and make the organization more attractive to investors and lenders.

Almost all intermediate accounting texts consider the issue of leases at some point. Wil-

liams, et al. (1994), for example, devoted an entire chapter to leases. From that chapter, we identified numerous business ramblings. We divided the business ramblings into the four categories identified in Von Halle (1997): definitions, facts, constraints, and derivations. The business ramblings are not listed in a separate appendix because of space limitations but the constraints are listed in Appendix A, the definitions in Appendix B, the derivations in Appendix C, and the facts in Appendix D.

The purpose of specifying the definitions, facts, constraints, and derivations from general business ramblings in the lease example is to illustrate the analysis and design process that should be followed. A comprehensive list of business rules, separated into the four categories, combined with an E/R diagram makes an excellent design for systems development. The business rules can be used in the database area as candidates for active database rules. At a minimum, the business rules can serve as a checklist to ensure that the systems requirements have been met for a newly developed system.

Conclusion

Though numerous analysis and design methods exist, business rules are unique in that they can be understood by non-systems persons. Business rules can also be integrated with other analysis and design methods to build more complete, robust models of accounting systems. Business rules provide insurance that all facets of a system are addressed. Frequently, some portion of an accounting system "falls through the cracks" until a later point in the system development life cycle. This can be a significant problem because either the design must be reworked or the omitted portion must be created as an "afterthought add on." Either method is costly, so avoiding missing portions of a system is paramount.

The usefulness of the business rules paradigm has been demonstrated in this article,

in the context of the accounting for leases problem, but the business rules methodology is robust and can be applied to a wide variety of accounting systems development projects.

There are numerous opportunities for future research in this area. To begin with, researchers might examine organizations that implement business rules as a standard part of accounting systems development to determine if the systems are "better" and if there is a cost savings. There is also an opportunity to see if the business rules approach is better for "harder" problems, easier problems, or is generally better. It would also be interesting to gather empirical data to see exactly what analysis and design approaches are being used in large numbers and correlate that data with measures of success.

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Appendix A - Constraints

Effect of leases

- 1 Debt/Equity ratio improves if the company leases assets in a manner that permits it to avoid reporting the assets and related liabilities in its balance sheet.
- 2 If some of the liabilities would have been current, leasing may improve current ratio.
- 3 If some of the liabilities would have been current, leasing may improve reported working capital.
- 4 Rate of return on assets employed improves if the company leases assets in a manner that permits it to avoid reporting the assets and related liabilities in its balance sheet.
- 5 When a lease contains provisions that change the substance of a transaction form merely the periodic payment of money for the use of property to an installment acquisition of substantial economic rights or benefits, the lease should be treated by the lessee as the purchase of an asset and the incurrence of a liability.

Lease treated as a sale

- 1 If the lease is treated as a sale, the lessee should record the purchase of an asset and the incurrence of a liability for the obligation assumed.
- 2 If the lease is treated as a sale, the lessor should record a sale of the property and

- recognize a receivable for the future rent.
 - 3 If the leased asset's value is not as great as the guaranteed residual value at the end of the lease, the guarantor must make up the difference in cash.
 - 4 If lessor is a manufacturer or dealer, fair value is usually the asset's normal selling price less any applicable volume or trade discounts.
 - 5 If the lessor is not a manufacturer or dealer, fair value is usually the cost or carrying amount.
 - 6 Revenue to the lessor consists solely of interest revenue from the financing function the lessor provides in a direct financing lease.
 - 7 Third party may lend money to the lessor, but require repayment from the lessee.
 - 8 When a lease contains a transfer of title clause, the lease is presumed to be a sale by the lessor and a purchase by the lessee.
 - 9 When the value of the lease is enough that it represents most of the fair value of the property, the lease is considered, in substance, a sale/purchase transaction.
- Lessee**
- 1 If either the transfer of title or bargain purchase option criterion is met, the leased asset is depreciated over the estimated useful life of the asset without regard to the lease term.
 - 2 If either the transfer of title or bargain purchase option classification tests are met, the lessee has, in substance, acquired all of the property rights inherent in the asset, with is properly classified as a plant asset.
 - 3 If one of the capitalization criteria are met, the lease is not considered equivalent to a purchase and the related asset and liability are not included in the lessee's balance sheet.
 - 4 If the amount of the lease payments is adjusted for a reimbursement to the lessor for executory costs, that amount is excluded in calculating the present value of the lease.
 - 5 If the lease contains a bargain purchase option, the minimum rental payments over the lease term preceding that option and the payment called for by the option are minimum lease payments.
 - 6 If the lease does not contain a bargain purchase option, minimum lease payments include all of the following: (1) the minimum rental payments over the lease term, (2) any guarantee of the residual value of the leased property at the expiration of the lease term, and (3) any payment that he lessee must make or can be required to make upon failure to renew or extend the lease at the expiration of the lease term.
 - 7 If the lease is capitalized because it meets either the length-of lease-term or amount-of-lease-payment criterion, the asset is amortized over the shorter of the lease term or the life of the asset.
 - 8 If the lease is capitalized because of either the transfer of title or bargain purchase option criteria, the lessee would classify the leased asset as a plant asset and depreciate it over its estimated life by the same depreciation method used for similar assets.
 - 9 If lessee does not know the rate implicit in the lease, the lessee's incremental borrowing rate is used.
 - 10 If the lessee enters into a lease that is in substance the equivalent of a purchase and that obligates the lessee in a manner equivalent to that of debt financing, the obligation must be included among the liabilities in the lessee's balance sheet.
 - 11 If either the transfer of title or bargain purchase option criteria are met, the lessee is acquiring the right to control the use of the asset after the end of the lease term until the end of its useful life.
 - 12 If the transfer of title or bargain purchase option tests are not met, and the lease meets either the length of lease term or amount of lease payment test, the lease is

- still classified as a capital lease.
- 13 Lease may permit the lessee to pay the residual value in cash and retain the asset; then the guaranteed residual value is essentially a purchase option.
 - 14 Lessee does not record a gain on the settlement of the residual value unless the lease contains a provision to return to the lessee a refund of lease payments equal to any excess of the appraised residual value over the guaranteed amount.
 - 15 When an operating lease requires unequal cash payments, rent expense should be recognized on a straight-line basis and determined by the total cash payments to be made over the lease term.

Lessor

- 1 Amount assigned as the cost of the asset cannot exceed the fair value of the asset at that time.
- 2 Both the lessor and the lessee must consider the four primary capitalization criteria in classifying a lease as either capital or operating; if one or more of those criteria are met, the lessor must further consider the two revenue-recognition criteria before making a final classification decision.
- 3 Deferred revenue account is established on the balance sheet if the cash received exceeds straight-line recognition.
- 4 Collectibility of rent and predictability of costs criteria must be met prior to recording a receivable and recognizing gross profit or interest revenue, considerations that have relevance only to the lessor.
- 5 If cash received is less than the rent revenue recognized on a straight-line basis, a receivable is established.
- 6 If the lessor is the manufacturer of the asset, the lease is most likely a sales-type lease.
- 7 If one or more of the four basic criteria are met, lessor must consider two additional revenue recognition criteria.

- 8 If residual value is guaranteed, it is included in the determination of the present value of the lease and in the lease amortization schedule as a final payment.
- 9 If residual value is not guaranteed, procedures must be altered to reflect this difference for both lessee and lessor.
- 10 If sales-type lease, present value of the residual is not included in the sales figure recorded by the lessor.
- 11 In sales-type leases or direct-financing leases, they reduce the amount of interest included in the net receivable and the amount of interest revenue that will be recognized.
- 12 Length-of-lease-term and amount-of-lease payment criteria are not applied if the lease term begins within the last 25% of the total estimated life of the property.
- 13 Lessor must reduce COGS by the present value of the residual if the residual is not guaranteed.
- 14 Once the conditions are met, the lessor must further classify the lease as a sales-type or a direct-financing lease.
- 15 Unless future rental collections are reasonably assured and future costs to be incurred under the lease are reasonable predictable, even a lease meeting one of the initial four criteria is accounted for as an operating lease by the lessor.

Leveraged Leases

- 1 If any of the criteria are not met, the lease is considered a direct financing lease rather than a leveraged lease.
- 2 The use of different interest rates results in different present value amounts and potentially important differences in the way leases are treated by the two parties to the lease.

Subleases

- 1 If either the length of lease term or the amount of lease payment criterion is met

- in the original lease but neither a transfer of title nor a bargain purchase option is provided, then the sublease should be subjected only to the new length of lease term and amount of lease payment criterion.
- 2 If the original lease contains either a transfer of ownership or a bargain purchase option, the original lessee is presumed to have acquired all of the rights associated with the property.
 - 3 If the original lease does not transfer title to the lessee, a sublease of the property from that lessee cannot contain a transfer of title to a sublessee.

Land Leases

- 1 For lessees and lessors to consider a lease of land a capital lease, the lease agreement must contain a transfer of title or a bargain purchase option.
- 2 If the fair value of the land portion of the leased asset equals or exceeds 25% of the total fair value of the leased assets, the land is considered separately in accordance with the provisions for leases of land only.
- 3 If the fair value of the land portion of the leased assets is less than 25% of the total fair value of both the land and building, the land portion can be ignored for purposes of lease classification.
- 4 The amount of the rental payment attributable to the land is considered to represent an operating lease unless the lease contains a transfer of title or a bargain purchase option.

Appendix B - Definitions

- 1 Amortizing rate: in a leveraged lease, represents that rate of interest that, when applied to the investment account balance in the years that the net investment is positive, will fully amortize the unearned revenue as interest revenue over the life of

the lease.

- 2 Bargain purchase option: allows the lessee to purchase the property at a price substantially lower than the expected fair value of the property at the time the option becomes exercisable.
- 3 Bargain renewal option: allows the lessee to renew the lease for an amount substantially lower than the fair rental of the property at the time the option becomes exercisable.
- 4 Capital lease: a rental agreement that represents, in substance, the purchase of an asset and the incurrence of a liability.
- 5 Direct-financing lease: does not give rise to manufacturer's or dealer's gross profit (or loss) on the assumed sale of the property to the lessee.
- 6 Estimated economic life: the remaining period the property is expected to be economically usable in its intended function without limitation by the lease term.
- 7 Estimated residual value: expected fair value of the property at the end of the lease term.
- 8 Executory costs: expenses necessary to operate and maintain the leased property.
- 9 Fair value: the price for which the leased property could be sold in an arm's length transaction.
- 10 Guaranteed residual value: lessee or a third party ensures that the lessor will realize a specified amount at the end of the lease term.
- 11 Initial direct costs: costs incurred by lessors that are essential in and directly related to originating a lease and that were incurred only because the particular leasing transaction occurred.
- 12 Interest rate implicit in the lease: rate that causes the gross future minimum lease payments to equal the fair value of the leased asset.
- 13 Lease: an agreement in which the owner of property, identified as the lessor, allows another party, identified as the lessee, to use the property in exchange for

- periodic payments.
- 14 Lease Agreement: specifies responsibilities of each party to the lease.
- 15 Lease term: fixed non-cancelable term of the lease plus all of the following periods.
- 16 Lessee: the party that is leasing the property.
- 17 Lessee's incremental borrowing rate: rate that the lessee would have incurred if the funds to purchase the asset had been borrowed from a bank or other financial institution.
- 18 Lessor: the owner of the property being leased.
- 19 Leveraged lease: Three-party lease agreement involving a lessee, a long-term creditor, and a lessor, in which the long-term creditor provides financing to the lessor.
- 20 Minimum lease payments: payments that the lessee is obligated to make in connection with the leased property.
- 21 Off-Balance-Sheet-Financing: leasing assets to avoid reporting the liability and the related asset that would have resulted from a purchase.
- 22 Operating lease: a rental agreement requiring periodic payments for the use of an asset.
- 23 Related parties: include a parent company and its subsidiaries, joint ventures, partnerships and partners, and investors and investees, provided that the parent company, owner, or investor has the ability to exercise significant influence over the operating and financial policies of the other party.
- 24 Sale-leaseback transaction: involves property that is simultaneously sold and leased back by the seller.
- 25 Sales-type lease: gives manufacturer's or dealer's gross profit (or loss) to the lessor.
- 26 Subleases: a lessee leases the property to the sublessee.
- 27 Symmetry: word that is sometimes used to describe the desirable outcome in which a lease that is treated as a capital lease by

the lessor is also treated as a capital lease by the lessee (the same is true for operating leases).

28 Unguaranteed residual value: residual value that is not guaranteed by the lessee or other third party.

Appendix C - Derivations

- 1 Determine the portion of the minimum lease payments associated with the land, the incremental borrowing rate is multiplied by the estimated fair value of the land.
- 2 Difference between the cost of the property on the books of the lessor and the fair value of the property is recorded as gross profit (loss) on the sale at that time.
- 3 Difference between the sum of the minimum lease payments and their present value is the interest to be recognized over the lease term.
- 4 Direct-financing lease, Lessor recognizes interest revenue over the lease term equal to the difference between the total lease payments and the present value of the lease.
- 5 Interest rate that the lessee applies to determine the present value of the future minimum lease payments is the lower of the lessee's incremental borrowing rate or the rate implicit in the lease, assuming the lessee has knowledge of the rate used by the lessor establishing the lease payments.
- 6 Material difference between the straight-line recognition of rent expense and the individual cash payments required by an operating lease, we recognize the balance sheet implications of the difference as either prepaid expenses or accrued payable.
- 7 Sales-type lease, lessor earns a gross profit equal to the difference between the present value of the lease payments and the manufactured cost of the asset.
- 8 Sales-type lease, the difference between the total lease payments that are required

- and the present value of those payments represents interest revenue to the lessor, mirroring the interest expense recognized by the lessee.
- 9 Two methods to split the liability: (1) compute the present value of the next payment to find the amount that will be presented as current each year, the remainder is noncurrent (preferred method) and (2) associate with the current portion all interest to be included in the next payment; the remainder is noncurrent.

Appendix D - Facts

Introduction

- 1 Companies may enter into leases to avoid reporting large liabilities incurred in the purchase of an asset.
- 2 Companies may enter into leases to avoid the need to disburse large amounts of cash to acquire needed assets.
- 3 Income tax implications of leases may be attractive.
- 4 Leasing provides the parties to the agreement much greater flexibility than is possible in an outright sale and purchase.
- 5 Off-balance-sheet-financing is advantageous from a financial reporting perspective because of its effect on the company's reported financial position and results on operations.
- 6 Rental rates are usually set at levels that recognize the relative distribution of the risks and rights of ownership to the two parties to the lease.

Initial Classification of Lease as Operating or Capital

- 1 FASB No. 13: A lease that transfers substantially all of the benefits and risks incident to the ownership of property should be accounted for as the acquisition of an asset and the incurrence of an obligation by the lessee.

- 2 In financial accounting, leases are initially classified as either operating or capital.
- 3 Operating lease does not represent the purchase of an asset.
- 4 Operating lease, the lease is not recorded and no new assets or liabilities are included in the accounting records of the lessee.
- 5 Operating lease, the lessee recognizes rent expense as it is paid.
- 6 Primary goal in accounting for all types of leases is to recognize the economic substance of a particular lease rather than its legal form.
- 7 Substance over form is used in the area of leases.

Lessors

- 1 Accountants use several methods to estimate residual value.
- 2 Amortization of leased assets is a cost allocation process that is required to apply the matching principle rather than an asset valuation process.
- 3 Capital lease, fair value of the leased property at the inception of the lease is greater (or less) than its cost or carrying value on the books of the lessor.
- 4 Capital leases normally take place when manufacturers or dealers use leasing as a means to market their products.
- 5 Capital lease, property is considered to be sold.
- 6 Cost or carrying amount of the property on the lessor's books and the fair value of the leased property at the inception of the lease are not materially different.
- 7 Do not attempt to anticipate increases in value or changes in price level.
- 8 Fair value is determined in light of prevailing market conditions at the inception of the lease.
- 9 Fair value encompasses diminished productivity and obsolescence.
- 10 Lease types that represent leasing circumstances that, in substance, indicate that he

	lessor has "sold" the property and obtained a receivable from the lessee: sales-type, direct-financing, or leveraged lease.	7	carefully assessed.
11	Lessors are required to classify a lease agreement into one of four possible types: operating, sales-type, direct-financing, and leveraged leases.	8	Effective interest method is used so that a constant rate of interest is recognized each period throughout the lease term.
12	Lessor earns profit both from the sale of the property and as interest revenue from financing the sale.	9	Entire asset, including the residual value, as been acquired by the lessee.
13	Operating lease: direct counterpart of lessee's operating lease.	9	Executory costs incurred directly by lessees are accrued and allocated to the periods benefited in accordance with generally accepted accounting principles in the same manner as other similar expenses.
14	Operating lease: in the lessor's eyes, it represents an agreement in which rent is received for the use of property owned by the lessor.	10	Executory costs that are included in the lease payments are subtracted in determining the minimum lease payments.
15	Operating lease, the lessor depreciates the leased asset in a normal fashion because the assets hasn't been sold to the lessee.	11	Fair value is reduced for any investment tax credit retained and expected to be realized by the lessor.
16	Operating lease, the lessor recognizes rent revenue during the time and the lessee uses the leased asset.	12	Four criteria for capital leases are: (1) lease transfers ownership of the property to the lessee by the end of the lease term, (2) lease contains a bargain purchase option, (3) lease term is equal to 75% or more of the estimated economic life of the property at the beginning of the lease term, and (4) the present value of the minimum lease payments at the inception of the lease is 90% or more of the fair value of the leased asset.
17	Operating lease, the property is not presumed to have been sold by the lessor to the lessee.	13	General principles that govern the systematic depreciation of other assets also apply to assets recorded under capital leases.
18	Residual value may be guaranteed to the lessor.	14	If a lease meets any one of four criteria it is tentatively classified as a type of capital lease by the lessors.
19	Residual value may be unguaranteed.	15	If a lease meets any one of four criteria it is treated as a capital lease by the lessee.
20	Three types of capital leases: sales-type, direct-financing, leveraged lease.	16	Inherent in these criteria is the assumption that the lessor will retain rights to the asset at the end of the lease term.
Capital Leases		17	It is possible for the carrying amounts of the asset and liability to be the fair value of the asset rather than the present value of the lease payments.
1	Accounting for the liability in a capital lease presents issues in determination of interest on the lease obligation.	18	Lease itself is not considered a recordable transaction, and no new assets or liabilities are reflected in the financial statements of the lessee at the inception of the
2	Amortization of the asset and interest relating to the lease obligation poses substantial accounting problems.		
3	Asset is classified as an intangible asset.		
4	Asset should not be depreciated over below its estimated salvage value.		
5	Balance sheet presentation for the lessee involves determining the amount and classification of the asset acquired by the lease and the liability represented by it.		
6	Economic substance of this clause must be		

- lease.
- 19 Lease may permit the lessee to pay the residual value in cash and retain the asset; then the guaranteed residual value is essentially a purchase option.
- 20 Lessee records the asset and a liability at the beginning of the lease term, at the present value of the minimum lease payments.
- 21 Lessee's capitalized right to the use of the property during the lease term is properly considered an intangible asset and identified as "leasehold rights" or other similar designation.
- 22 Lessees should recognize rent expense on a straight-line basis unless some other allocation method is more representative of the time pattern over which the property is employed.
- 23 Lessors must apply two additional criteria to permanently classify a lease as a capital lease.
- 24 Criteria concern the evidence necessary to record a receivable and the ability to predict any future expenses associated with the leased property.
- 25 GAAP require more evidence to record receivables than to record payables, and the same relationship exists between revenues and expenses.
- 26 Lessors are required to assess the collectibility of rent and the predictability of costs prior to recording a capital lease.
- 27 The collectibility of rent and predictability of costs criteria must be met prior to recording a receivable and recognizing gross profit or interest revenue, considerations that have relevance only to the lessor.
- 28 Lessor, the lease capitalization criteria govern the pattern of the amounts recognized and whether revenue from leases is recognized at the beginning of the lease or over the life of the lease.
- 29 Minimum lease payments are reduced by any executory costs to be paid by the lessee to the lessor.
- 30 Periods covered by ordinary renewal options during which a guarantee by the lessee of the lessor's debt related to the leased property is expected to be in effect.
- 31 Periods covered by ordinary renewal options preceding the date a bargain purchase option is exercisable.
- 32 Periods for which failure to renew the lease imposes a penalty on the lessee in an amount such that renewal appears, at the inception of the lease, to be reasonably assured.
- 33 Periods representing renewals or extensions of the lease at the lessor's option.
- 34 Primary financial reporting problem that the lease capitalization criteria are attempting to resolve is that off-balance-sheet financing by lessees.
- 35 Rent expense is usually recognized as lease payments are made.
- 36 Residual value that the lessee guarantees to the lessor is included in the minimum lease payments.
- 37 Transfer-of title and bargain-purchase-option criteria are applied to all leases usually record a liability for capital leases at the present value of the minimum lease payments.
- 38 When a lessee acquires the use of a leased asset for most of its useful life, accountants conclude that, in substance, a sale has taken place.
- 39 Whether a lease is capitalized, and if it is, how it is capitalized, are important factors in the recognition of revenue by the lessor.
- Liability**
- 1 Liability can be presented as: (1) a net amount or (2) a lease liability can be recorded at its total dollar or gross amount and the interest portion recorded as a separate discount account. Interest is then recognized by amortizing that discount.
- 2 Implicit assumption is that the lessee is responsible for the executory costs and pays

them directly.

- 3 This payment causes recognition of expenses at the time of payment.
- 4 The lessor can require the lessee make payment directly to the lessor and the lessor will pay the 3rd parties.
- 5 Liability is subject to current and noncurrent classification.
- 6 There are two methods to split the liability: (1) associate with the current portion all interest to be included in the next payment; the remainder is noncurrent and (2) compute the present value of the next payment to find the amount that will be presented as current each year, the remainder is noncurrent (preferred method).

Operating Leases

- 1 Asset is depreciated over its normal life, not the lease term.
- 2 Asset leased is depreciated in the normal fashion by lessor.
- 3 Asset leased is usually classified as part of the plant assets section of the balance sheet of the lessor.
- 4 Do not include amounts expended for advertising, soliciting potential lessees, servicing existing leases, rent, depreciation, and supervisory and administrative functions.
- 5 Ideally, accounting for operating and capital leases by lessors and lessees should mirror each other.
- 6 In an operating lease, lessors usually recognize rent revenue on a straight-line basis over the lease term.
- 7 Initial direct costs incurred by lessor are capitalized and amortized over the term of the operating lease as an expense to be matched against the rent revenue.
- 8 Revenue from an operating lease is rent revenue.
- 9 Straight-line is used even if cash received under the terms of the lease varies from such a pattern.

Lessors and Capital Leases

- 1 Asset on the books of the lessor is a lease receivable.
- 2 Direct-Financing Lease: (1) lessor has usually purchased the asset rather than having manufactured it, (2) lessor's function is to provide financing to the lessee, (3) lease payment schedule is established so that the present value of the lease payments approximates the carrying amount or cost of the asset, and (4) no gross profit on the transaction.
- 3 Guarantee of residual value protects the lessor from unexpected obsolescence, excess usage, unexpected market changes, and other factors that might affect the value of the used asset that will be returned to the lessor at the end of the lease term.
- 4 Initial direct costs and capital leases: (1) related to sales-type leases are charged to expense at the beginning of the lease term and reduce the amount of gross profit recognized on the lease and (2) related to direct-financing leases debited to the amount of unearned income or the net receivable.
- 5 Leases that are treated as if the asset that is subject of the lease had been sold to the lessee.
- 6 Lessors may earn two types of revenue from capital leases: gross profit and interest revenue. Sales-type lease, lessor earns both types. Direct financing, lessor earns only interest revenue.
- 7 Lessor must impute a new interest rate that will be used to amortize the interest over the lease term at a constant rate.
- 8 Must meet one or more of the four basic capitalization criteria
- 9 No final amount to cover the residual value is included in the computation of the lease liability for the lessee.
- 10 When the residual value is guaranteed, the lessor's asset is labeled receivable.
- 11 When the residual value is not guaranteed, it is labeled investment.

Leveraged Leases

- 1 For the lessee, leveraged leases are accounted for in the same manner as other nonleveraged leases.
- 2 For the lessor, leveraged leases are direct financing leases that meet 4 criteria. Lease involves three parties: a lessee, a long-term creditor, and a lessor. The financing provided by the long-term creditor must be nonrecourse as to the general credit of the lessor.
- 3 The lessor's net investment in the lease must decline in the early years of the lease and rise during the later years before final elimination.
- 4 The lessor's investment tax credit must be deferred and allocated to income over the life of the lease.

Sale-leaseback

- 1 Seller-lessee classifies the lease in a sale leaseback transaction in accordance with the four classification criteria for leases.

Subleases

- 1 New rent collectibility and cost predictability tests must also be met in sublease situations.
- 2 Sublessor cannot transfer to a sublessee more rights than were obtained in the original lease.

Related Parties

- 1 Other situations and circumstances may also created related-party conditions.
- 2 SFAS 13: economic substance, rather than mere form, governs accounting for all leases, including those between related parties.

Land

- 1 A lease of real estate should not be classified as a sales-type lease unless criteria related to predicting the collectibility of rent and the amount of the down payment are met.
- 2 Land is considered to have an unlimited life for financial accounting.
- 3 Lessors must also meet the rent collectibility test and cost predictability test.
- 4 The remaining amount of the lease payment is related to the building and that portion of the lease is classified using the same criteria as are applied to any other leased asset.
- 5 When a lease involves both land and a building, accountants must assess the magnitude of the portion of the assets represented by the land.
- 6 When only part of a building is leased, estimates of cost and fair value are usually possible and appraisals and replacement cost estimates may be appropriate in determining the fair value and cost portions of the building.