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Finding the RIGHT PARTS – Fast

Parts grow in number and pin counts while library resources diminish. The right tools can mean less time searching – and more time designing. **by MARK HEIDORN**

Thanks to reorganizations and merger mania, companies are reducing the size of their library support organizations, yet maintaining the same workload. This leaves library support organizations with the monumental task of consolidating data from different libraries, built to different specifications and on different tool sets. In many cases, different tool sets need to be maintained from the single, consolidated library organization. Pin counts of new parts are increasing rapidly, increasing the time and effort to create new data, all while companies have fewer resources – and tighter time budgets. And the quality of the EDA library directly affects the quality and design cycle of designs.

An EDA library is more than just a collection of ECAD elements. There is a significant difference between the data needed to create a schematic and board layout, and to get a design to market. In many cases the owners of the necessary data are throughout the organization, as well as vendors and other third-parties.

As components and products have life cycles, so too do EDA parts. Since various views of data can be reused for corporate parts, each view and the related collection of views must be created and managed in a successful enterprise library. Here we will outline the principles and processes for implementing a library management system.

A Good Game Plan

To create a successful library system, set the goals. This may sound like a simple task, but too often companies get bogged down with technology, ideologies and trying to be everything to everyone, and lose sight of the main objectives. First, identify the business goals of the company. It does no good to create a system that reduces time-to-market if (low) cost is the company's significant differentiator.

After the business goals have been established, the design goals must be identified. What do the designers need to choose components, cost, lead time and color? These critical characteristics must be provided on the designers' desktop when choosing components. Each of these characteristics will need to be identified and assigned a source so that the part-creation team will know where to get the values when creating new components. Goals will determine the best processes to implement the data that should be created and maintained in the system, and how that data should be used.

Once these goals have been identified, then the standards to which the data must be created should be identified and documented. There may or may not be a single standard to which each view is created. In reality, there may be multiple standards depending on the business unit, geographic location, product line, etc. If multiple standards are to be maintained across the organization, then the infrastructure must take this into account.

Documenting the goals and standards for an enterprise library is known as library specification. Good library specifications become "live" documents because as changes occur, the documents continue to reflect those changes. Keep in mind that changes always occur. Business goal changes, changes in EDA tool formats, addition of tools into the design process and other factors all affect the library specification.

The infrastructure can vary widely based upon the goals, standards, customer environments, performance, geography and other requirements. Large, global companies typically require large, robust, flexible infrastructure, while smaller companies typically require easy-to-maintain, less expensive infrastructures. For example, using Oracle Enterprise for the metadata engine for EDA library characteristics permits customers a highly tunable, widely distributed system. Developments in technology permit enterprise companies to integrate business system data from their CIS and ERP systems, vault and distribute EDA library data across their organization, and filter out unnecessary information to their users. Thus, a company with a central library team can then create, maintain and distribute a wide set of data, tailored to the needs of each business unit.

A key step in implementing an enterprise library system is to permit one or several "pilots" to validate the processes and data sets during a design creation process. These pilots should be focused on a small set of success criteria. The projects should be real projects, not staged, so that the results can be measured and refined. Care should be taken not to make these pilots' objectives overly broad; many pilots have failed as a result of tackling too many goals at once.

Library Processes

Part research/select is the process and set of tools used to search for and select the correct components for use in a design. Studies have shown that designers can spend up to 30% of their time searching for components and component-related information. In many cases part searching has to be done manually or across many systems (vendor Web sites, internal CIS systems and view libraries). The result of an incomplete search is that incorrect components are often selected for a design. These may be parts with long lead-time or a history of reliability problems, or obsolete parts that impact manufacturing and/or time to market.

In order to make part research efficient, care must be taken to provide designers with enough information to make the right choices, but not too much information so that the designer is overwhelmed with sorting through irrelevant data. An example of this is a company that provides the purchasing CIS system as the system for designers to use for selecting parts. This system has been designed for use by component engineers or purchasing agents, not electronics

designers. The taxonomy of the components is not functional, but is based on different criteria so that designers find it difficult to find data to begin with. And the purchasing department uses properties that designers do not (initial cost, burdened cost, last purchase cost, etc.) which makes it difficult for designers to know which fields they should use.

The result of a poor research process is that designers will spend time looking for data rather than designing, causing a higher number of new part requests, many for components that have already been approved.

Part request/ECN. Once a designer has determined that the desired component has not been approved, the part request process is initiated. There is typically a separate part request process used for the component and for the EDA library part, but these two processes should be linked. The enterprise library should reflect the corporate life cycle status of the component, but each view of the part (logic symbol, layout symbol, EDA mapping, etc.) needs to be created and validated by the library team. Since the business parameters are just as important as the electrical parameters, it is essential that an enterprise library integrate the two part request processes.

The part creation process encompasses the steps necessary to create, test, edit and link all the necessary EDA views together for a new component request. These steps ensure that each library part entered into the library is of high quality.

The part release process permits the newly created/edited part in the library to be used in designs. Sometimes the release can be restricted to non-production designs, or other factors. Part release is necessary to officially denote, move or transfer a part and all its pieces to a released library. This ensures that under construction or temporary data are not inadvertently used.

Part obsolescence is the process for removing data from the released library. Without a good part obsolescence process, the released library will grow to an unmanageable size. It is not enough to simply remove the part from the library. There must be a method for an adequate replacement and allowances for obsolete parts to be used in legacy designs, while new designs are blocked from use.

The Technology

Data management. A library environment consists of two major areas: EDA data files to be used to drive the EDA tools (symbols, cells, etc.) and a parametric database that stores the properties and relationships between the data files. The data management technology controls data files through such facilities as check in/check out, file distribution and synchronization, version control and other file manipulation capabilities.

Database access layer. This permits tools to interact with data stored in the parametric database in a consistent fashion such that standardized functions can be written and reused when new database versions are implemented.

API. There are many interpretations and needs of an application programming interface (API) in different applications; we will focus on the needs for an enterprise library environment. The API can be divided into three major sections:

- Data access provides the company access to consistent and complete library information. This means that all necessary library information can be accessed through a single language/access method, not different schemes for different information. For example, suppose a user wants to extract the part number, value (capacitance or resistance) and approval rating from the library. A single interface should be able to get all of the information and not have to use ODBC and an ASCII parser to extract the information.
- Functional access provides certain value-added functions, in addition to extracting data from the library. This permits users to create batch and other functionality not built into the tools. For example, part placement is one function that a company would want to use in an interactive utility.
- GUI extension provides the capability to extend the GUI, meaning that if a company has created a utility, it has some method for invoking that utility in an existing tool, and it has a graphical means of invoking and specifying the options for that utility. More complex extensions would permit the user to modify the existing GUI or blend their utilities deeper into the existing GUI. The basic capability is all that is needed for the library environment, but it is a critical piece. The library environment is a process-oriented solution, and pieces of that process are often very specific to a company. A company needs a seamless, integrated process/set of tools, and embedding some custom functions into the existing tools is sometimes the only way for success.

Automated part creation. Library teams are shrinking in size, yet part introductions, part pin counts and complexities grow. While the number of parts and the time it takes to create each part increases, the number of resources available to build and test them is shrinking. This is driving technology for automated part creation tools.

Generators have been around for years, but these tools have assumed an all-or-nothing approach. This means that if the input to the generator does not exist, or is not of sufficient quality, the result cannot be used in a production library. The advent of XML standards and integrating part editors with generators permit part developers to significantly increase productivity and leverage a common source for multiple tool vendors formats and manufacturing standards. **PCD&M**

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