

**EDGE SOFTWARE**



**INCORPORATED**

**ENGINEERING DESIGN  
AUTOMATION  
SPECIALISTS**

*Success depends on having the EDGE.*



Thank you for your interest in *EDGE* Software. *EDGE* is one of the few independent software service companies that specialize in the Engineering Design Automation industry. We have worked throughout the entire design flow with both leading semiconductor producers and leading EDA tool vendors.


The information contained in this packet provides you with a brief introduction to who we are, what we do, and how *EDGE* Software can be of value to your business. To accomplish this, we present an overview of our services, highlight our capabilities, and offer some brief examples of our experience. The content is broken down as follows:

- **CORPORATE OVERVIEW**
- **EDA EXPERIENCE**
- **AVAILABLE SERVICES**
- **RATES AND BILLING**
- **DEVELOPMENT PROJECTS**
- **CLIENT REFERENCES**
- **CONTACT INFORMATION**

Because every EDA development effort poses its own set of unique challenges, it is impossible to compose one document that completely addresses everyone's specific needs. What we have attempted to do in the following pages is simply provide a glimpse into some of our capabilities. *EDGE* Software is a full custom services firm. As such, it's our business to quickly adapt to meet our clients' diverse needs... and we have a proven track record of doing just that.

We are always interested in exploring new projects, so if you're interested in discussing your particular development efforts with us, please contact us at: (512) 371-EDGE. We're confident that our staff of experienced professionals can be a valuable addition to your team.

Sincerely,



John C. Davidson  
President  
EDGE Software, Inc.

## CORPORATE OVERVIEW

**WHO WE ARE...** *EDGE* Software Inc. is a custom software services firm based in Austin, TX. We have extensive experience in many diverse areas of EDA software and hardware development. Our experienced staff of professionals has worked with a wide array of platforms, languages, and tools in the course of our various projects.

**WHAT WE DO...** Quite simply: we write code. However, unlike most software companies, we realize that's only part of the job. We don't just write code... We *develop professional software*. This is why our clients choose *EDGE*. Many companies can find programmers to generate code. However, few have the experience to produce professional quality software.

Our ability to develop code is only the beginning of our capabilities. Being a "custom" firm, *EDGE* is able to provide our clients with a variety of services. A few of the services available from *EDGE* include:

-  SYSTEM ARCHITECTURE AND DESIGN
-  SOFTWARE DEVELOPMENT
-  PROJECT MANAGEMENT
-  IT SUPPORT AND NETWORK ADMINISTRATION
-  COMPLETE TURNKEY SYSTEMS
-  TESTING AND QUALITY ASSURANCE
-  FEASIBILITY STUDIES
-  TECHNICAL DOCUMENTATION AND TRAINING SERVICES
-  PLACEMENT AND RECRUITING SERVICES

*EDGE*'s services are available on both a fixed and variable cost basis.

**PARTNERSHIPS...** Our goal at *EDGE* Software is to become our client's first choice for software services. To accomplish this, we strive to exceed our client's expectations. *EDGE* clients cannot simply be satisfied with the job we do... they must be *impressed*. In this manner, *EDGE* strives to build lasting partnerships and ensure client satisfaction. It is upon this foundation that our clients are confident in returning for future development needs.

**EXPERIENCE...** Providing quality software services begins with experience and ends with dedication. *EDGE* Software's professionals have years of experience in design, development, and testing of countless software projects. It is this experience, along with our dedication to giving clients the best quality service possible, which sets *EDGE* apart from other firms.

**A PROVEN TRACK RECORD...** *EDGE* Software has a proven track record of providing high quality, custom software and project management services. Our client list includes Fortune 100 corporations, government agencies, and small businesses. Our experience is broad and spans the complete software development cycle.

## EDA EXPERIENCE

In the Semiconductor EDA field, *EDGE* has been involved in developing everything from chip-level design browsers down to transistor place and route tools. We have worked with leading semiconductor producers (such as Texas Instruments, Advanced Micro Devices, etc.) and leading industry tool vendors (such as Cadence Design Systems, Mentor Graphics, etc.). Our Integrated Circuit (IC) projects have utilized most of the industry standard tools and languages, thus enabling *EDGE* to gain an independent, third-party perspective. Through these projects, we have gained unique experience with numerous tools, APIs, languages, and methodologies implemented throughout the EDA industry. *EDGE* has been called upon by chip producers to help increase design flow efficiency and even leading EDA tool vendors themselves have called upon *EDGE* Software's experience to help them with their product development efforts.

The fast-paced world of EDA software development poses a unique set of challenges. Semiconductor CAD departments must constantly walk the line between utilizing the industry standard "off-the-shelf" tools and their own internally developed systems. The struggle to integrate the more generalized industry tools with their own customized tools and design flows is a never-ending effort. *EDGE*'s diverse experience enables us to be of unique value to our EDA clients.

*EDGE* is one of the few independent software development firms with the highly specialized experience needed to support EDA software development. EDA development requires the developer to have a unique combination of a strong engineering foundation as well as solid software development skills. To get this combination, companies traditionally either train their engineering staff internally, or hire independent contractors on an as-needed basis. Training staff internally requires time that is often not available due to the fast-paced changes in semiconductor design cycles. Hiring independent contractors is often a gamble. Companies don't know if they've hired a quality developer until they're already committed. In addition, because these individuals are usually hired for short periods then released, there is no continuity with the project and/or the internal design team. *EDGE* solves these problems.

*EDGE* provides its clients with immediate, proven development resources. By forming long-term relationships with our clients, we maintain continuity with their development efforts. Our staff becomes familiar with their particular development environments, needs, and methods. This enables *EDGE* to respond rapidly, as our client's needs change.

*EDGE* has experience throughout the entire IC design flow. The following are a few of processes, technologies, tools, and languages with which we have experience:

### PROCESSES:

- Library Characterization
- Simulation and Modeling
- Floor-planning & Timing Budgeting
- Logic Verification
- Synthesis
- Automatic Place and Route (APR)
- Layout Parasitic Extraction
- In-place Optimization and Back-annotation
- Static/Dynamic Timing Analysis
- Physical Verification

### TECHNOLOGIES:

- System-on-Chip (SoC)
- Application Specific Integrated Circuits (ASICs)
- Digital Signal Processors (DSPs)
- Very Large Scale Integration (VLSI)
- Very Deep SubMicron (VDSM)

- Cadence TestBuilder Verification Reuse Methodology (VRM) and Transaction Verification Modules (TVMs)

 **TOOLS:**

- Cadence Tools (NC-SIM, Silicon Ensemble, etc.)
- Mentor Tools (DA, DC, Calibre, etc.)
- Synopsys Tools (PT/DC/LC shells, Arcadia, etc.)
- Other Vendors: SiliconMetrics (CellRater), Silicon Valley Research (DCP), Ultima (UDC), Avant! (PL, AP, etc.), and others.

 **LANGUAGES:**

- RTL, SPICE, VHDL, Verilog, Verilog PLI (Programming Language Interface), ALF (Advanced Library Format), Synopsys Library Format, IBIS (I/O Buffer Information Specification), Mentor's Ample Language, Cadence's Pillar Database, and others.
- C++, C, Assembly, Lisp, Skill, Pascal, FORTRAN, COBOL, Tcl/Tk, Tix, Perl, Python, Swig, shell scripting, XML, HTML, CGI, Java, JSP, and others.

 **PLATFORMS:**

- Unix (Solaris, SunOS, HP-UX, Linux, AIX), Windows (XP back to 2.x), DOS, OS/2, VMS, MacOS

As a custom software development firm, *EDGE* Software has amassed an impressive resume of EDA projects. It's the custom nature of our development projects that has enabled *EDGE* to acquire vast experience in many diverse areas of the design flow. Our experience, in conjunction with our quality personnel, enables *EDGE* to be dynamic enough to tackle almost any EDA project. No matter what your development challenge, *EDGE* consultants can be a valuable resource.



## AVAILABLE SERVICES






*EDGE* Software provides its clients with a wide range of services spanning the entire design flow. Clients can utilize *EDGE* for the entire flow or only for selected portions that require additional support and consultation. Our services are available on an hourly or project basis (see Rates and Billing).

As a custom software development firm, there are no limits on which projects we can undertake. However, some of the more common EDA services available from *EDGE* include:



**CONFIGURATION MANAGEMENT...** *EDGE* consultants can setup and maintain a revision control system to ensure quality and maintainability of project data such as library models, logic/gate netlists, timing budgets, assembly/high-level source code, and CAD flow shell scripts.


**ENGINEERING ALGORITHMS AND NUMERICAL METHODS...** Our consultants have experience implementing high-performance algorithms and numeral methods required to perform analysis of design, timing, and physical data stored in existing tool databases.

### TOOL SERVICES...

-  **GUI DEVELOPMENT...** *EDGE* can customize existing tool interfaces or develop completely new graphical user interfaces to suit custom and/or standard CAD flows.
-  **DESIGN AND DEVELOPMENT...** We can design and implement new tools based on a set of requirements from the project lead, CAD engineers, and known shortcomings in existing flow tools and operations. We have developed model generators, place and route systems, and countless other tools.
-  **SHELL INTERFACES...** Often, numerous command-line scripts and operations are required to implement existing CAD flows. We can implement top-level command-line or GUI interfaces to input control parameters, execute tool commands, and/or perform a series of commands required to help automate the flow.
-  **INTEGRATION...** Seldom do new tools simply “drop in” to an existing CAD flow. We are experts at integrating tools into existing CAD flows. We can develop interface code, migrate existing data, and create bridge applications to facilitate tool transitions.
-  **PORTING...** *EDGE* can port existing tools to new operating systems (i.e. Solaris to HP, HP to Windows, etc.), new compiler versions, or optimize them for performance (i.e. 32 to 64 bit).

### DATA SERVICES...

-  **DATABASE DESIGN AND DEVELOPMENT...** *EDGE* consultants are very familiar with numerous design databases and can create efficient storage systems for design, timing, and physical data.
-  **EXTRACTION AND ANNOTATION...** We have developed countless systems for parsing, extracting, and annotating all kinds of CAD flow data.

 **PORTING...** Existing data must often be ported to new tool formats, re-organized to optimize flow efficiency, and ported to newer versions of existing tools.

In addition to EDA related development services, *EDGE* can also provide a full range of “standard” software development services including:

**SYSTEM ARCHITECTURE AND DESIGN...** Design is often the most critical phase of any software development effort. In many cases, the quality of the finished software is directly proportional to the quality of the initial design. One metaphor is particularly appropriate... Ask yourself this question: What quality of house would you get if you built it with no blueprints? Custom software development is an investment. As with any substantial investment, planning is crucial. However, there is a trade-off. It is possible to over-design. This leads to lost time and money. *EDGE* has the experience to strike the proper balance.

**DEVELOPMENT...** The key to quality development is sharp people with a well thought-out plan. Good organization allows developers to modularize the development process. This results in rapid implementation of a system that can be easily tested and expanded for future versions. *EDGE* provides a highly qualified technical staff with years of software development experience.

**PROJECT MANAGEMENT...** *EDGE* clients often require additional consulting and managerial support to supplement their in-house development efforts. *EDGE* is uniquely qualified to provide this vital support. The professionals at *EDGE* have worked on countless software development efforts, and as a result are well equipped to quickly anticipate and address problem areas on a given project. *EDGE* can serve as troubleshooters or, if need be, assume management of an entire project.

**IT SUPPORT AND NETWORK ADMINISTRATION...** *EDGE* has IT network professionals familiar with all types of heterogeneous networks. Clients have utilized our services to design, install, and manage their network systems. Some clients have even outsourced the IT support for their entire office to *EDGE*.

**COMPLETE TURNKEY SYSTEMS...** Complete, integrated systems are no problem for *EDGE*. Integrating hardware and software to form a new automated system is a classic utilization of *EDGE*'s resources. *EDGE* has negotiated discount hardware reseller agreements with Network Appliance, Auspex Systems, Tatung, and Wallingford Computer Services to help provide our clients with a low-cost source for their hardware needs. No matter what your hardware needs are, from massive file servers down to desktop PCs, *EDGE* can get it for you... and often for less than buying it direct!

**TESTING AND QUALITY ASSURANCE...** With our experience in the software development field, *EDGE* can provide an extremely valuable third-party perspective, when brought in to test/QA another vendor's software. System testing is fundamental to the quality of any software. Although many developers take short-cuts and settle for only testing their software during development (Alpha-Testing), we at *EDGE* always encourage our clients to include a *distinct* testing phase to any software project. This testing phase allows the system to be tested as a completed unit, and is usually done by someone other than the developer. In this manner, additional user feedback on the functionality and usability of the software can be integrated prior to initial release. Completion of the testing phase is accomplished through preliminary use by actual end users of the software in the real world conditions of the client's site (Beta-Testing).

**FEASIBILITY STUDIES...** Prior to committing substantial resources to a given project, often clients want to obtain more data on the obstacles related to successfully completing the project. *EDGE* team members have experience serving in this “recon” type role. They can quickly and efficiently identify the primary and secondary “hot spots”, then prepare a Feasibility Report for the client. This report contains a ranked list of all the technical, logistical, and managerial problems associated with the proposed project. In addition, it provides preliminary estimates for cost and time.

**TECHNICAL DOCUMENTATION AND TRAINING SERVICES...** *EDGE* consultants have developed numerous user manuals, reference guides, and introductory training materials to accompany our custom software over the years. This experience has provided us with the ability to quickly generate production quality documents. Rather than hiring technical writers (who are often unfamiliar with the underlying technology) to extract information from developers, many of our clients simply have *EDGE* develop the supporting materials. *EDGE* consultants have become so good at this in fact, that many clients have engaged *EDGE* for the sole purpose of creating technical documentation and complete training programs.

**PLACEMENT AND RECRUITING SERVICES...** Finding just the right person for a challenging technical staff position can be quite difficult. Standard placement services often provide overwhelming lists of “candidates,” however many of the resumes provided to the client firms are seldom worth reviewing. This is because the placement firms are not technical people and therefore cannot properly filter the resumes for the hiring managers. *EDGE* solves this problem for managers by taking a low volume, high quality approach. With our technical background, we can serve as a front-end filter for managers who don't want to spend their time reviewing every resume with “C” listed as a language.





## RATES AND BILLING

EDGE Software Inc. has two general methods of payment for its services: fixed cost and hourly.

**FIXED COST...** Fixed cost is used primarily when there is a clearly defined project. For example, the goals, tasks, and scope of the project are well defined. This method is often used for our application development efforts. The end project cost is directly proportional to the complexity and scale of the application and are negotiated on a project-by-project basis.

**HOURLY...** The hourly method is used when these items are less clear. For example, on an R&D project, or when it is not practical to thoroughly define a project up-front due to time limitations or lack of information. Hourly rates vary based on type of work, the experience level of the person performing the work, and the length of the engagement. Engagement terms are generally: Individual hourly, 3 months, 6 months, and 12 months, with rates decreasing for longer term engagements. Rates range from \$30/hr for low-end documentation and testing up to \$150/hr and higher for top-level project management and high-end technical development.

**MAXIMIZE VALUE...** EDGE Software's rates are structured to maximize the value for our clients. Rates are scaled according to the type of work done and the experience of the individual doing the work. EDGE staffs projects with the proper combination of team members to maximize the return for the customer thus saving them time and money.

**BILLING AND PAYMENT...** EDGE Software's standard billing practice is to invoice semi-monthly with payment due within two weeks of the invoice date. This practice is used on all hourly contracts unless a separate payment arrangement has been negotiated. Billing terms on fixed price contracts is always defined within the project's contract. These terms generally reflect a percentage up-front, a percentage upon completion of a significant milestone, a percentage upon delivery, and a percentage as a retainer until final acceptance by the client.



## DEVELOPMENT PROJECTS

The following lists just a few examples of our previous EDA development projects:

**TESTBUILDER** Cadence Design Systems engaged EDGE Software to assist in the design, development, and implementation of its TestBuilder (TB) Verification Reuse Methodology (VRM). Cadence showcased its VRM offering at the 2001 Design Automation Conference (DAC). The VRM utilizes a mixture of Verilog/Vhdl and C++ to create a transaction-based verification solution for IP that increases testbench reuse, establishes functional coverage, and minimizes debug time. By creating Transaction Verification Modules (TVMs) for each interface, the VRM simplifies the IP verification problem. EDGE was involved in porting the TVMs to newer TB versions, improving execution performance, and the overall source code management/release process for the Verification Platforms group. In addition, EDGE developed training materials for the VRM and TVM deployment efforts. The interfaces involved during this project were AMBA, Utopia, Infiniband, and GMII. Development was primarily performed in C++ on the Solaris and HP platforms.

**VRM TRAINING** EDGE developed training and presentation materials for Cadence Design Systems' VRM and TVM deployment efforts. These materials include classroom slide presentations, self-paced labs, and reference materials. The materials were generalized so they could be utilized across the AMBA, Infiniband, Utopia, and GMII interfaces.

**GUI MODELER** EDGE Software consultants developed a fully customized IP core packaging tool for Cadence Design Systems. This application involved a multitude of steps and options. A step-by-step approach was devised to fully automate the workflow including model qualification, compilation, package verification, and package delivery. In addition to interacting with various simulation engines such as Verilog/VHDL and other Cadence specific tools, the GUI had real-time connections with the process flow and automatically updated the status to show various stages of compilation, test vector application, verification matrix, pass/fail states, and furnished detailed summary reports. The tool was developed primarily in incrTcl (object-oriented TCL) with a Tk front end on the Solaris platform.

**DVS** The Deliverable Versioning System (DVS) was developed for Mentor Graphics Corporation as part of its Quickuse Development System (QDS). QDS is a Web-based IC design flow system that enables engineers to maintain versioning control and continuity during the design process. DVS functions much like the popular source-code control system CVS in that it allows the user to add, checkin, checkout, update, and remove files and deliverables from one of many possible repositories called "vaults." EDGE developed the command line portion of DVS using Java that utilizes API calls to interact with an Oracle database. DVS serves as the foundation of the QDS project and allows engineers to checkin/checkout designs and/or code as deliverables ensuring their validity during future phases of the design flow process. Development was primarily performed in Java on the Solaris and Windows platforms.

**DCP** EDGE was brought in by Silicon Valley Research, Inc. to design and implement the graphical user interface for its new EDA floor-planning tool, Design CockPit (DCP). The product was shown for the first time at the 1999 Design Automation Conference (DAC) to highlight the new innovative features of the underlying technology. The design and implementation of the system was accomplished on a very strict timetable in order to complete the product, and demonstrate its functionality at DAC. The interface development accomplished in Perl/Tk running on the Solaris platform.

**CELLRATER** This project was performed for Silicon Metrics Corporation of Austin, TX in an effort to expedite the release of its flagship product, CellRATER. EDGE consultants were called in to supplement the existing development staff during the initial phases of ramping the product to market. EDGE's primary role involved developing software for library model generation, model verification, and quality control. Model formats included VHDL/VITAL, Synopsys, ALF, IBIS, and Verilog. CellRATER, which debuted at the 1998 Design Automation Conference (DAC), is marketed to the semiconductor industry as an extremely accurate and fast library characterization tool. The development on this project included various EDA industry tools (Synopsys, ModelSim, etc.) and involved a combination of many different languages including C, C++, and Python. The development platform was Solaris, both x86 and Sparc.

**PILLAR DATABASE TRAINING** EDGE consultants were engaged by Cadence Design Systems' Educational Services Group (ESG) to develop a course outline and training program for Cadence's Pillar Design Database application programming interface (API).

**PANTHER** This project was performed for the Software Engineering Services Group (SES) of Texas Instrument's (TI) Application Specific Integrated Circuits (ASIC) Division in Dallas, Texas. Panther was the internal code name given to TI's TGC6000 DSP chip series gate array design flow. Upon completion, Panther was distributed to TI clients (both external and internal) throughout the world for immediate implementation. For this project, GUI extensions were integrated into Cadence's Design Planner to provide end-users access to the TI specific

functions. The interface was implemented in a simple sequence format to ensure users would execute each flow task in the appropriate sequence. Flow tasks ranged from array initialization to floorplan rule checks. This project was done in Lisp, Perl, and various shell scripts utilizing the underlying Cadence Pillar database. The development was performed on the Sun Solaris and HP-UX platforms.

**PILLAR  
BROWSER**

This project involved designing and developing a hierarchical GUI for Advanced Micro Devices' (AMD) Pillar Design Database. This was the master database, which held the entire design for AMD's CPU chips. The GUI allowed detailed "browsing" of the underlying database contents and structures. In addition, a schematic generator was developed to allow the engineers to generate and view schematics "on-the-fly" for the design. This gave the engineers a visual link between the logic schematics and the information stored within the hierarchical design database (net loads, capacitance, etc.). The Browser was a multi-user, client-server application that allowed each user to connect to a network database server or read in a design database locally. The project was done in C, C++, Tcl/Tk, and Tix using Cadence's Pillar Database. The software was developed on the HP-UX (UNIX) platform. Other EDA tools used were Synopsys and Mentor Graphics.

**CELLGEN**

This project was a standard cell place and route tool designed for Advanced Micro Devices (AMD). CellGen was initially developed as a support tool for AMD's CAD department to assist engineers and speed the design flow. The primary function of the tool was to automate the layout and connection routing of the physical transistors (poly, diffusion, metal, etc.) within the standard cell library. This software and the technology therein were later sold by AMD to High Level Design Systems Inc. (HLDS) to be incorporated into HLDS's line of EDA tools. HLDS continued contract development on this project for one year thereafter until all development was moved internally. Cadence Design Systems, Inc. later purchased HLDS and now utilizes HLDS technology as the foundation for its tool suite. This project was done in C, C++ and ported from HP-UX (UNIX) to SUN/OS (UNIX), Windows 3.1x, and Windows NT. Other EDA tools used included Mentor Graphics, Synopsys, and Cadence.

**K5 TIMING**

This contract with Advanced Micro Devices (AMD) was to support a major CAD effort to develop an alternative timing analysis methodology for its K5 part. The goal of this effort was to improve the ability of AMD VLSI engineers to gauge the performance of a given design prior to silicon runs. This effort involved integrating many different EDA tools as well as significant new coding. The system was built on top of the HLDS Pillar hierarchical database and required an in-depth knowledge of this system. This project was coded using C++, C, Tcl/Tk under HP-UX (UNIX). Other EDA tools used included Synopsys and Mentor Graphics.



## CLIENT REFERENCES

References and detailed project descriptions are available upon request.



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