

AVATAR JOB SCHEDULING WHITE PAPER

VERSION 4.0

MARCH 2003

DOCUMENT REVISION 1.0

TERMS OF USE / SOFTWARE LICENSE AGREEMENT

Thank you for using Avatar, a software application provided by Vexus Consulting Group Inc. (the "Company"). This page states the terms and conditions (the "Terms" or the "Agreement") under which you may use the software. Please read this page carefully. By use of the software you accept and agree to be bound, without limitation or qualification, by these Terms. If you do not accept any of the Terms stated here, do not use the software. The Company may, in its sole discretion, modify or revise these Terms at any time. The Company may, in its sole discretion, modify, revise, or rewrite the software at any time, without penalty of prosecution or breach of this agreed contact.

Use of Material

The contents of this document, including but not limited to text, software, photographs, graphics, illustrations, artwork, video, music, sound, names, logos, trademarks, service marks and other material ("Material" or "Materials") are protected by copyright and other laws in both Canada and elsewhere. The Material includes both content owned or controlled by the Company, and content owned or controlled by third parties and licensed to the Company.

You may not sell or modify the Material or reproduce, display, publicly perform, distribute, or otherwise use the Material in any way for any public or commercial purpose without the written permission of the Company. Special rules may apply to the use of certain software and other items provided by The Company. Any such special rules are listed as "Legal Notices" are incorporated into this Agreement by reference.

Warranty of Information

THE SOFTWARE AND MATERIALS ARE PROVIDED ON AN "AS IS" BASIS WITHOUT ANY WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED. THE COMPANY AND ITS SUPPLIERS, TO THE FULLEST EXTENT PERMITTED BY LAW, DISCLAIM ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF TITLE, FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY AND NON INFRINGEMENT OF PROPRIETARY OR THIRD PARTY RIGHTS. THE COMPANY AND ITS SUPPLIERS MAKE NO WARRANTIES ABOUT THE ACCURACY, RELIABILITY, COMPLETENESS, OR TIMELINESS OF THE MATERIAL, SERVICES, SOFTWARE, TEXT, DOCUMENTS, GRAPHICS, AND LINKS.

THE COMPANY DOES NOT WARRANT THAT THE SOFTWARE WILL OPERATE ERROR-FREE OR THAT THIS SOFTWARE OR ITS SERVER(S) ARE FREE OF POSSIBLY HARMFUL ITEMS. IF YOUR USE OF THE SOFTWARE OR THE MATERIAL RESULTS IN THE NEED FOR SERVICING OR REPLACING EQUIPMENT OR DATA, THE COMPANY IS NOT RESPONSIBLE FOR THOSE COSTS. IF YOUR USE OF THE SOFTWARE RESULTS IN POTENTIAL AND/OR REALIZED LOSS, THE COMPANY IS NOT RESPONSIBLE FOR THESE LOSSES.

Limitation of Liability / Disclaimer of Damages

Your use of the Software is at your own risk. If you are dissatisfied with any of the Materials or other contents of the Software or with these Terms and Conditions, the Company's Privacy Policy, or other policies, your sole remedy is to discontinue use of the Software.

IN NO EVENT SHALL THE COMPANY OR ITS SUPPLIERS BE LIABLE TO ANY USER OR ANY THIRD PARTY FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL, EXEMPLARY OR LOST PROFITS) RESULTING FROM THE USE OR INABILITY TO USE THE SOFTWARE OR THE MATERIAL, WHETHER BASED ON WARRANTY, CONTRACT, TORT, OR ANY OTHER LEGAL THEORY, AND WHETHER OR NOT THE COMPANY IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Indemnity

You agree to defend, indemnify, and hold harmless the Company, its officers, directors, employees and agents, from and against any claims, actions or demands, including, without limitation, reasonable legal and accounting fees, alleging or resulting from your use of the Material (including Software) or your breach of the terms of this Agreement. The Company shall provide notice to you promptly of any such claim, suit, or proceeding and shall reasonably assist you, at your expense, in defending any such claim, suit or proceeding.

TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	Purpose and Scope of this document.....	1
1.2	Document Conventions.....	1
1.3	Documents Related.....	1
1.4	Contacting Us.....	2
2	THE JOB SCHEDULING PROBLEM.....	3
2.1	Lack of Control.....	3
2.2	Lack of Audibility.....	3
2.3	High Maintenance Operations.....	3
2.4	Heroes and Villains.....	3
3	THE SOLUTION.....	4
3.1	Building Your Own.....	4
3.1.1	Sufficient At First.....	4
3.1.2	Attempting to Bridge The Gap.....	4
3.2	Buying A Solution.....	4
3.3	Choosing Avatar.....	4
4	AVATAR FEATURES.....	5
4.1	Distributed Design.....	5
4.2	Secure Communications.....	5
4.3	Simple Installation.....	5
4.4	Division of Responsibility.....	5
4.5	Heterogeneous Network Representation.....	5
4.6	Limitless Capability.....	6
4.7	Complete Control.....	6
4.8	Universal Interface.....	6
5	AVATAR APPLICATION PROGRAMMING INTERFACES.....	7
5.1	External API.....	7
5.2	Internal API.....	7
6	AVATAR 4.0 ARCHITECTURE.....	9
7	TECHNICAL FEATURES.....	10
8	SUMMARY.....	11

INDEX OF TABLES

Table 1.1 Document Conventions.....	1
Table 1.2 Related Documents.....	1
Table-1.3 Contact Information.....	2
Table 7.1: Avatar Feature List.....	10

INDEX OF EXAMPLES

Figure 5-1 External API Control Flow.....	7
Figure 5-2 Internal/External API Control Flow.....	7
Figure 6-3 Avatar 4.0 Schema.....	9

1 Introduction

What is Avatar? Avatar is a sophisticated, yet simple to use, batch processing client/server application. Avatar is designed to bridge the gap between what standard Unix based systems provide for batch scheduling (*cron*) and the requirements of most (if not all) Unix based information technology companies. Avatar provides features for reporting on success or error, creating windows of time for commands, system load balancing, dynamic module loading and a highly designed extensible framework.

1.1 Purpose and Scope of this document

This document is intended for someone who is trying to better understand the role of a job scheduling suite with respect to an operations environment.

1.2 Document Conventions

In order to keep the documentation as consistent as possible The following table outlines the conventions that are used in this document.

TABLE 1.1 DOCUMENT CONVENTIONS

TYPE	PURPOSE
Bold Courier Font	A command to be typed in.
Courier Font	Output of a command.
Bold dollar sign. (\$)	Bourne shell prompt. (Not to be typed in).
Bold percent sign (%)	C shell prompt (Not to be typed in).
Bold pound sign. (#)	Root shell prompt. (Not to be typed in).
<i>Italic Courier Font</i>	A filename or directory name.
CAPITALIZED BOLD	Environment variable names.

1.3 Documents Related

TABLE 1.2 RELATED DOCUMENTS

DOCUMENT	DESCRIPTION
Avatar Installation Guide	This document provides the information to install the license and install both the client and the server.
Avatar Command File Guide	This document outlines the syntax of the Avatar Command File.
Avatar Administration Interface	This document provides all the information required to use administration interface.
Avatar Client Interface	This document provides all the information required to use client interface.

1.4 Contacting Us

To ask any pre-sales or post-sales questions, please use one of the following methods.

TABLE-1.3 CONTACT INFORMATION

METHOD	ADDRESS
World Wide Web	http://www.vexus.ca
E-mail	sales@vexus.ca

2The Job Scheduling Problem

Any business which has a operations control centre or a lights out operations centre, experiences the same problem at one point or another: automation. Regardless of the task, reconciliation, report generation or nightly batch processing, being able to set, control and audit unmanned requirements removes a highly repetitive nature from the operations staff. Currently many businesses use cron (the default Unix based scheduling agent) for this purpose. Cron is insufficient for many reasons.

2.1Lack of Control

Cron does not allow the operators to start, stop or pause jobs which may be running. In fact cron does not do anything but start a command at a given time. Once the command is running, cron is no longer an element of the equation. To control the job, the operator must have intimate knowledge of all processes running on the machine and know which one process they are looking for. In short, controlling a cron enabled job is close to impossible.

2.2Lack of Audibility

As difficult as it is to control a cron enabled job, it's even harder to get a cron enabled job to provide meaningful centralized audit trail. To do this would require a developer and a tremendous amount of work. Even still it would not be completely sufficient. Ultimately, running batches via cron is like taking a leap of faith. Faith, although a wonderful thing, does not make a 24/7 operations department run efficiently.

2.3High Maintenance Operations

Using cron creates a situation where the operations staff will be busy fighting fires and calling in second line and third line support staff to fix any problem. Not an efficient use of people's time. If a problem were to arise, even if the operations staff were well versed in the applications and their responsibilities; restarting the application would require an intimate knowledge of all the tasks under their control. This is an unfair responsibility to put onto the operations staff, since running batch jobs is one small element of a much more complex job.

2.4Heroes and Villains

Operations departments are not successful because of heroic individuals. Although, they are frequently saved by them. Relying on a hero to keep an operations department running is planning for disaster. Putting all the operational knowledge into one person, or a small band of heroes, is in essence planning for the castle to crumble. Using cron exclusively requires that some heroes be on the payroll.

3The Solution

There are really only two ways to solve the problem: build or buy.

3.1Building Your Own

Building a solution to work around cron's deficiencies has probably been done more times than there are days in a year. Some homegrown solutions work very well, and perform the task they were designed to do.

3.1.1Sufficient At First

Even homegrown solutions can be elegant, but as time passes the solution becomes outdated. Eventually even the best homegrown solutions outlive their usefulness. One of two events will happen: more time will be spent on the homegrown solution or an off the shelf product will be purchased.

3.1.2Attempting to Bridge The Gap

Many try to bridge a very wide gap; only to end up failing. Even for the solutions which do work, the problem is that eventually the person who wrote it may leave or that a development team will need to be maintained. (for support and enhancements). Eventually the company may be left supporting a very complex piece of software which is integral to their survival.

3.2Buying A Solution

Of course buying a solution has it's pitfalls as well. From the operations departments perspective it's another application which they have to support. One of many. If it takes a long time to install, or is difficult to install it creates more problems that it solves. Since job scheduling suites are intricate applications, if the EOM did not take the operations time and effort into the creation of the software, the purchase may be perceived as a mistake.

3.3Choosing Avatar

The job scheduling niche does have a lot of company. Avatar is one player amongst many; most which have many of the same features. Since many companies feel they need only simple job scheduling (cron with some extra features) all the products look the same. Being a distinctive member of the crowd is a tough thing to do. This white paper should serve as both an informative guide to job scheduling needs, operational needs and how Avatar provides the answers to those issues.

4 Avatar Features

Avatar is one of several major players in the job scheduling arena. Making an informed choice with regards to a scheduling solution can be tedious. There are so many issues to cover and address; both for facility and day to day operational issues. We at Vexus feel that Avatar covers all the major issues and provides innovative solutions to some of the less frequent, but serious, issues.

4.1 Distributed Design

Creating a distributed application requires a new means of thinking. Job scheduling agents are required to be fully network aware and location independent. Job scheduling agents need to be able to address issues of system optimization through load balancing, remote command execution and even command multicasting. This makes it imperative that a job scheduling suite needs to be distributed by definition and highly network aware. Running a command locally or remotely should bear no difference on the overall design and implementation of the application. This is the founding design philosophy of Avatar.

4.2 Secure Communications

Avatar comes with 32 bit security by default; upgradable to 384 bit. Considering that an operations department is the life line of many (if not all) companies, security should be one of the first elements of concern. Many current job scheduling applications do not seem to address security or skirt the issue. Avatar is the most secure job scheduling application in the marketplace to date.

4.3 Simple Installation

Avatar comes in some of the simplest install packages available. For Solaris, Avatar comes in solaris package format. Installing Avatar is a one command task. Installing Avatar takes less than a couple of minutes. Considering that an operations department may need to install Avatar in many locations; a simple installation is paramount to an operations department success in maintaining the systems.

4.4 Division of Responsibility

Operations departments need to monitor many machines and just as many different applications. Providing a limited user interface to the operations department which allows them to perform their job and do no harm, is essential. Avatar provides 3 levels of user groups each with different facilities available to them. The user groups are: *user*, *operator* and *guest*. This division allows for users to create and manipulate their batches but not see anything else. It allows the operators to see everyone's batches but only control and not manipulate. It allows the guest the ability to browse but little else.

4.5 Heterogeneous Network Representation

The more complex a system environment may be, the more likely the chance that the environment is heterogeneous. In fact, even simple environments have a high chance of being heterogeneous. So being able to display all job scheduling network information on one display, regardless of operating system is a solid advantage. Avatar allows for a single interface to communicate with various flavours of operating system at the same time to provide a birds eye view of the job scheduling state, regardless of the operating system.

4.6 Limitless Capability

Many applications are built for one purpose only. There is nothing unusual about that; it's standard practice to understand what needs to be built, then build it. Without sufficient foresight or a highly tuned knowledge of the product niche, products usually are built in a static way. Expanding them is a complex, tedious and expensive process. Avatar was designed and built with the ability to easily expand, via the internal and external interfaces¹. This means expanding Avatar is simple, quick and cheap.

4.7 Complete Control

Being able to start a command, or group of commands is not the only thing a job scheduling suite needs to be able to do. The suite needs to provide enough control to the operators to pause or stop an active job. Without this ability, you might as well be using cron.

4.8 Universal Interface

Avatar's main client is a CGI web based interface. This means any client, regardless of hardware, software or operating system can interact with the Avatar server.

¹The interfaces are described in greater detail later in the document.

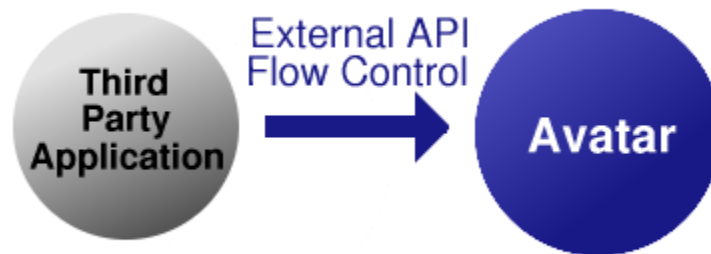
5 Avatar Application Programming Interfaces

Avatar has two types of programming interfaces²; internal and external.

5.1 External API

The Avatar external API has been provided for third party applications to interact with Avatar natively. This allows a third party application to communicate with and control Avatar; through a native interface. This type of interface is very common and most all applications on the market these days have an external API. Figure 4-1 demonstrates the direction of control for most standard API's.

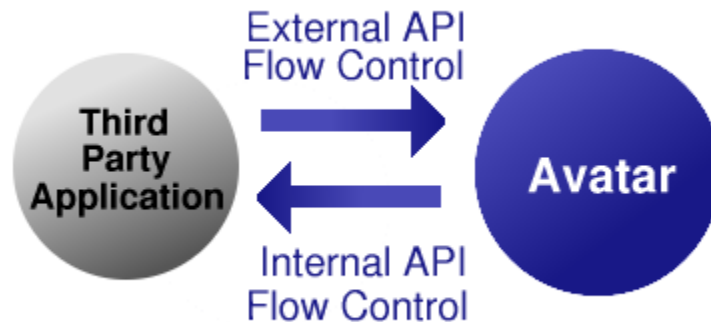
Figure 5-1 External API Control Flow.



5.2 Internal API

The Avatar internal API provides a layer of extensibility which most applications do not, or can not, provide. The Avatar Internal API provides a facility that allows Avatar to control third party applications. Many applications have what they call plug-ins, modules or adapters. These extensions are built by the OEM and take a tremendous amount of time. Avatar provides the ability to not only extend into third party applications, but allows third party developers to extend Avatar independently of the OEM. Figure 4-2 demonstrates the added direction of control which Avatar's Internal API provides.

Figure 5-2 Internal/External API Control Flow.

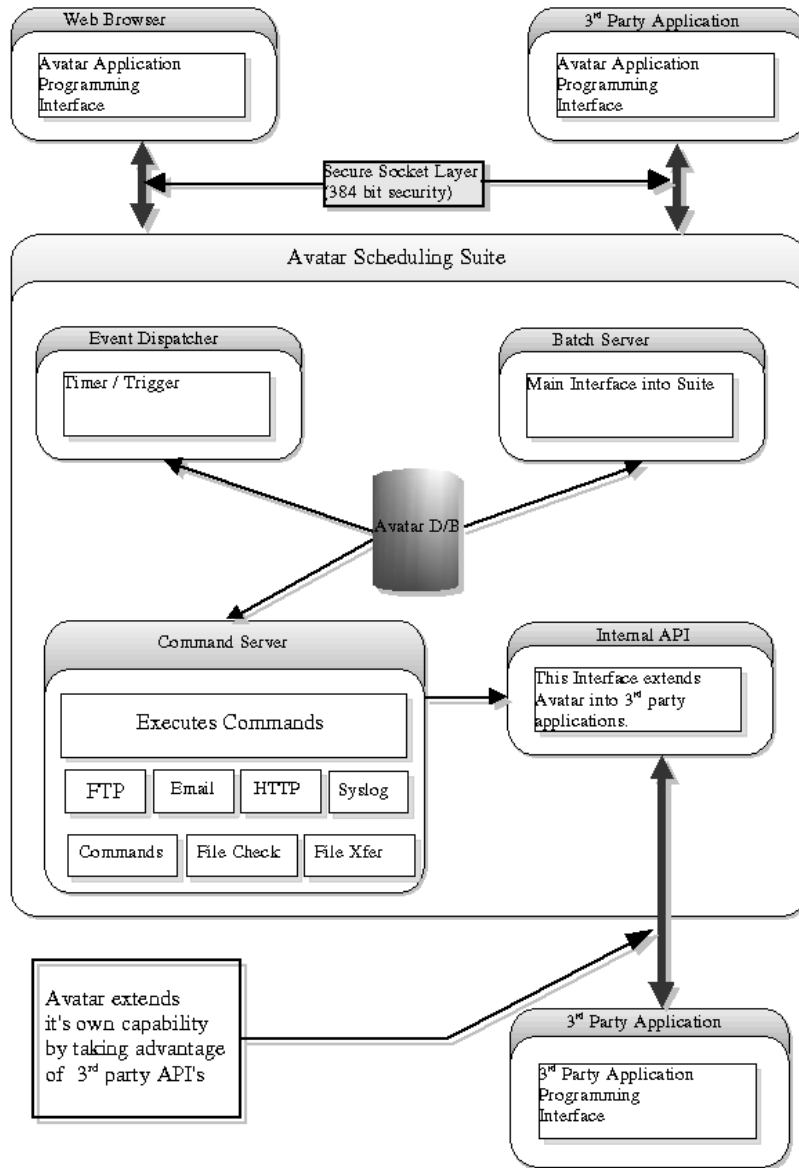


²Also referred to as an API or SDK (Software Development Kit)

6Avatar 4.0 Architecture

The following is the logical architecture of Avatar 4.0.

Figure 6-3 Avatar 4.0 Schema



7 Technical Features

To summarize Avatar's advantages, the following table provides some of the feature highlights.

TABLE 7.1: AVATAR FEATURE LIST

FEATURE	ADVANTAGE
Strong Encryption	No other job scheduling suite mentions security or SSL encryption. Avatar 4.0 offers 32 bit encryption by default with upgrade packs of 64, 128, 256 and 384 bit security. With Avatar's highly extensible design; we will add more SSL packs as we create the encryption keys.
Highly Extensible Design	Avatar 4.0 was redesigned to be highly extensible. Avatar 4.0 will offer extension modules to 3rd party applications. To extend into a 3rd party application is simple, painless and quick. When a 3rd party module is purchased, there is no configuration or re-installation required to install. Just copy the module in the right directory and the server will automatically detect the new module.
User Definable Roles	Expanding on Avatar's pre-defined roles in Version 3, Version 4 now allows for user definable roles. Using octal based permission sets, Avatar 4.0 allows a batch administrator to define and assign roles to users. Allowing for over 36 types of roles, a batch administrator has complete control over users permissions.
Highly Discrete Permissions/Highly Secure	Avatar 4.0 allows for permissions to be defined based on a combination of user, host, command type and command action. This provides more options for securing an Avatar installation. Installing Avatar on your network does not mean that your network has a security hole. Security is our number 1 concern and Avatar 4.0 addresses security at every opportunity.
Web Interface	Avatar ships with a web interface allowing for any client on any platform to interact with the servers.
Small Footprint	Being one of the most feature rich job scheduling suites available, it's also the smallest. Avatar installs in roughly 4 megabytes of disk space and runs in roughly 2 megabytes of memory. This small footprint makes Avatar a non-invasive addition to the operations department role call of applications.

8Summary

Many companies use cron to fulfill their day to day scheduling needs. As the companies needs become more sophisticated, cron stops becoming a solution and starts becoming a problem. Mainly because cron was designed to do one thing; start a command at a given time. Nothing else. That is why Avatar exists. Companies who build their own solution run into issues of maintenance. Companies who purchase applications which do not address issues of both function and operational costs, become a burden on the people who it's meant to help the most.

Avatar strives to not only be the most feature rich and flexible job scheduling agent in the market space, but the easiest to install and maintain.