



**ALEPH  
OBJECTS<sup>®</sup>**  
**INCORPORATED**

**OPERATIONS MANUAL**

**Aleph Objects Operations Manual**

**by Aleph Objects, Inc.**

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# Contents

<b>Introduction</b>	
<b>Welcome Aboard</b>	<b>ix</b>
Free Software, Libre Innovation, Open Source Hardware	x
<b>1 Information Technology</b>	
<b>Downtime is Intolerable</b>	<b>11</b>
1.1 Overview	12
1.2 Public Websites	12
1.3 Employee Services	16
1.4 Workstations	19
1.5 VoIP Phones	36
1.6 Mobile Cell Phones	36
1.7 Server Daemons	37
1.8 Servers	42
1.9 3D Printer Cluster	45
1.10 Network	46
<b>2 Customer Relations Management</b>	
<b>Phone, Email, Forum, Chat</b>	<b>49</b>
2.1 Helpdesk	50
2.2 Using the Phones	52
2.3 Forum	53
2.4 RMA	53
2.5 Chat	53
<b>3 Human Resources</b>	
<b>Us</b>	<b>55</b>
3.1 Professional Employment Organizations (PEO)	56
3.2 Employee Benefits	56
3.3 Logging hours in OpenERP	56

## CONTENTS

3.4 Requesting time off in OpenERP . . . . .	56
3.5 Recruitment / Interviewing . . . . .	56
3.6 Performance . . . . .	56
3.7 Training . . . . .	56
3.8 Organizational Chart . . . . .	58
3.9 Schedules . . . . .	58
<b>4 Purchasing</b>	
<b>Buying and Receiving . . . . .</b>	<b>63</b>
4.1 Requester . . . . .	64
4.2 Materials Planner . . . . .	64
4.3 Purchase Approver . . . . .	66
4.4 Accounting . . . . .	67
4.5 Notes . . . . .	68
4.6 Products . . . . .	68
4.7 Suppliers . . . . .	68
4.8 Inventory . . . . .	68
<b>5 Locations</b>	
<b>We Are Here . . . . .</b>	<b>69</b>
5.1 Aleph Mountain . . . . .	70
5.2 Fulfillment . . . . .	70
5.3 Contract Manufacturers . . . . .	70
5.4 Customer . . . . .	70
5.5 Employee . . . . .	70
5.6 Historical . . . . .	70
<b>6 Manufacturing</b>	
<b>Open Source Hardware . . . . .</b>	<b>73</b>
6.1 Supply Chain . . . . .	74
6.2 Configuration . . . . .	74
6.3 Manufacturing Process . . . . .	84
6.4 Safety . . . . .	87
6.5 Pre-sub Assembly . . . . .	87
6.6 Pilot Line . . . . .	87
6.7 Main Line . . . . .	87
6.8 Quality Control . . . . .	87
6.9 Packaging . . . . .	87
6.10 Lean . . . . .	87

## CONTENTS

<b>7 Marketing and Public Relations</b>	
<b>New and Deprecated Media</b>	<b>89</b>
7.1 Trade Shows / Events	90
7.2 Web Ads	90
7.3 Social Media	90
7.4 Promotions	90
7.5 Traditional Deprecated Media	90
<b>8 Products</b>	
<b>Buy and Sell</b>	<b>91</b>
8.1 New Product Introduction	92
8.2 Part Numbers	92
8.3 Serial numbers	92
8.4 Inventory	92
<b>9 Sales</b>	
<b>Moar</b>	<b>93</b>
9.1 Quotes	94
9.2 Orders	95
9.3 Accepting Customer Payments	98
9.4 Value Chain	99
9.5 Customers	99
9.6 Export Compliance	99
9.7 Phones	100
9.8 Incoming OpenERP Email	100
9.9 Products	100
<b>10 Shipping</b>	
<b>Delivery and Receiving</b>	<b>101</b>
10.1 Serial Numbers	102
10.2 Delivery	102
10.3 Inventory	102
10.4 Export Compliance	103
10.5 Products	103
10.6 Harmonized codes	103
10.7 Country of origin	103
10.8 NAFTA	103
<b>11 Warehouse</b>	
<b>First In, First Out</b>	<b>105</b>

## CONTENTS

11.1 Products . . . . .	106
11.2 Inventory . . . . .	106
11.3 FIFO . . . . .	106
11.4 Locations . . . . .	106
<b>12 Accounting Finance . . . . .</b>	<b>107</b>
12.1 Chart of Accounts . . . . .	108
12.2 Periodic Processes . . . . .	108
12.3 Payables . . . . .	108
12.4 Receivables . . . . .	108
12.5 Taxes . . . . .	109
12.6 GAAP . . . . .	110
<b>13 Research and Development Libre Innovation . . . . .</b>	<b>111</b>
<b>14 Contact Phone, Email, Web, Location . . . . .</b>	<b>113</b>
14.1 Support . . . . .	114
14.2 Sales . . . . .	114
14.3 Website . . . . .	114

# List of Figures

1.1	Aleph Objects Network Overview, May, 2015 . . . . .	12
1.2	Aleph Objects website, www.alephobjects.com . . . . .	13
1.3	LulzBot website, www.lulzbot.com . . . . .	14
1.4	LulzBot user discussion forum, forum.lulzbot.com . . . . .	15
1.5	Open Hardware Assembly Instructions Kit, ohai-kit.alephobjects.com . . . . .	15
1.6	Aleph Objects analytics, analytics.alephobjects.com . . . . .	16
1.7	Aleph Objects Web Mail, aomail.alephobjects.com . . . . .	17
1.8	Aleph Objects ERP Server, erp.alephobjects.com . . . . .	18
1.9	Aleph Objects Opsview Monitoring, ops.alephobjects.com . . . . .	18
1.10	Aleph Objects Project Tracking, projects.alephobjects.com . . . . .	19
1.11	ARandR, configure second monitor . . . . .	20
1.12	Arduino, compile LulzBot 3D printer firmware . . . . .	20
1.13	Audacity audio editor . . . . .	21
1.14	Blender 3D CAD . . . . .	22
1.15	Chromium web browser viewing Wikipedia . . . . .	22
1.16	LulzBot Cura 3D printer control software . . . . .	23
1.17	Epiphany web browser viewing Wikipedia . . . . .	23
1.18	Evince PDF viewer viewing AOOM . . . . .	24
1.19	FreeCAD . . . . .	26
1.20	Galculator . . . . .	26
1.21	Aleph Objects Network Detail, May 2015 . . . . .	47
1.22	Aleph Objects Network Diagram, February 2014 . . . . .	48
3.1	Organizational Chart . . . . .	57
3.2	Aleph Objects Org Chart dot . . . . .	59
3.3	Weekly Company Meetings . . . . .	60
3.4	Monthly Company Meetings at 8:00AM MST . . . . .	61
6.1	Main Line Layout . . . . .	88



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# **Introduction**

# **Welcome Aboard**

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# Free Software, Libre Innovation, Open Source Hardware

Aleph Objects, Inc. is a Free Software, Libre Innovation, and Open Source Hardware company based in Loveland, Colorado, USA. Aleph Objects manufactures the LulzBot line of 3D printers, sold worldwide.

This manual outlines the operation of the company.

---

**Information Technology**

**Downtime is Intolerable**

---

## 1.1 Overview

The Aleph Objects network is comprised of workstations, phones and servers at Aleph Mountain and our upstream providers. See figure 1.1 for an overview of Aleph Objects' network, figure 1.21 for a detailed network diagram, and figure 1.22 for an older network diagram.

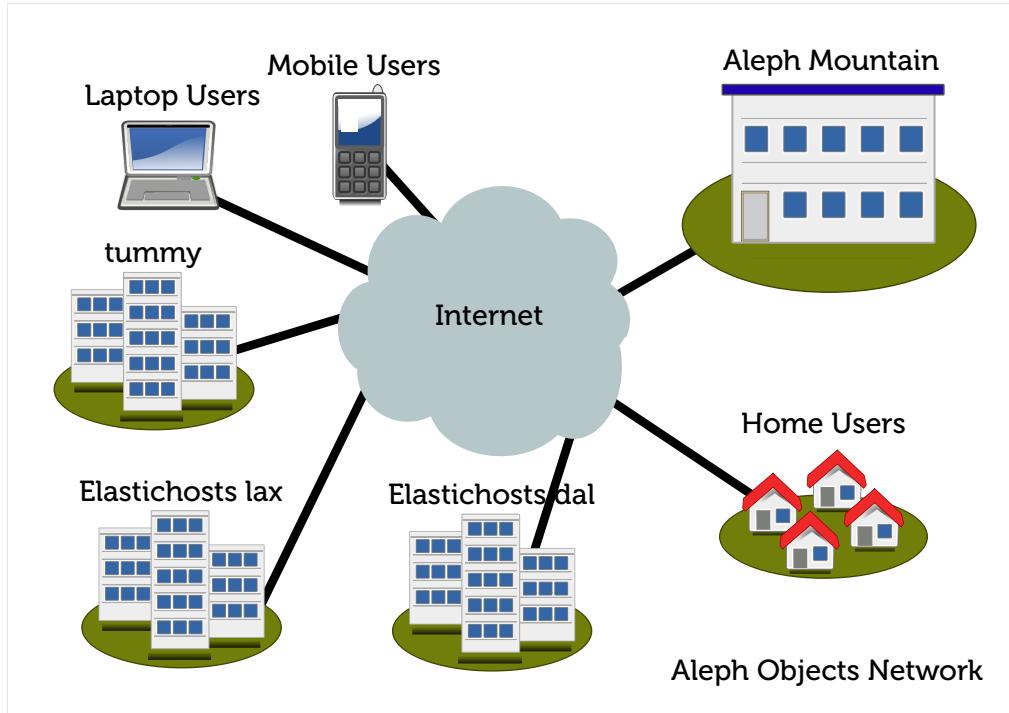


Figure 1.1: Aleph Objects Network Overview, May, 2015

## 1.2 Public Websites

These websites are provided for the public.

## 1.2. PUBLIC WEBSITES

### Aleph Objects

<https://www.alephobjects.com> — Main Aleph Objects website.



Figure 1.2: Aleph Objects website, [www.alephobjects.com](https://www.alephobjects.com)

### LulzBot

<https://www.lulzbot.com> — Main LulzBot website.

### Aleph Objects Development Archive

<https://devel.alephobjects.com> — Public development files for Aleph Objects.

### LulzBot Development Archive

<https://devel.lulzbot.com> — Public development files for LulzBot.

### Aleph Objects Software Downloads

<https://download.alephobjects.com> — Aleph Objects downloads.

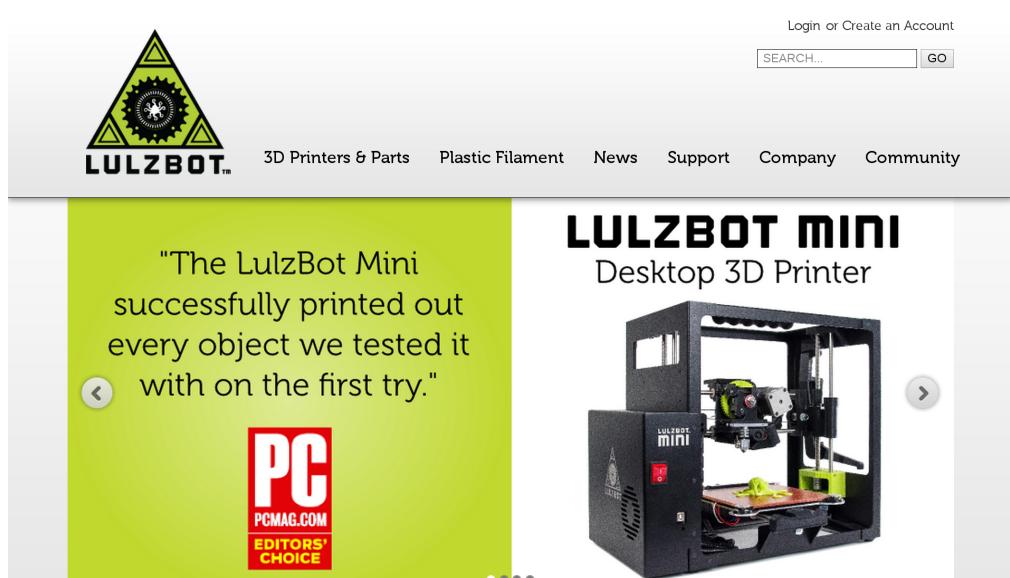


Figure 1.3: LulzBot website, [www.lulzbot.com](http://www.lulzbot.com)

## LulzBot Products Final Release Files

<https://download.lulzbot.com> — Final release source code for LulzBot products.

## LulzBot User Discussion Forum

<https://forum.lulzbot.com> — User discussion forum for LulzBot.

## Open Hardware Assembly Instructions Kit

<https://ohai-kit.alephobjects.com> — Visual work instructions for assembling products and user support.

## Newsletter

<https://phplist.alephobjects.com> — Newsletter mailing list.

## 1.2. PUBLIC WEBSITES

Search...

FAQ Search Register Login

Board index

It is currently Mon May 25, 2015 7:10 pm

View unanswered posts • View active topics

GENERAL	TOPICS	POSTS	LAST POST
<b>Hardware</b>	1056	7443	by GeorgeKuzik Mon May 25, 2015 3:38 pm
<b>Software</b>	250	1350	by MikeO Fri May 22, 2015 10:17 pm
<b>Filament</b> Help with printing with specific plastic filaments.	202	1278	by ricardobbb Sun May 24, 2015 2:23 pm

DEVELOPMENT	TOPICS	POSTS	LAST POST
<b>Hardware</b> YMMV...	141	1453	by piercel Sat May 23, 2015 12:18 am
<b>Software</b> YMMV...	34	276	by inventabuild Sun May 24, 2015 1:22 pm

COMMUNITY	TOPICS	POSTS	LAST POST
<b>News and Announcements</b> Share news and announcements happening in the world of 3D Printing and Libre/Open Source hardware and software.	37	138	by Orias Thu May 21, 2015 7:12 am
<b>User's Gallery</b> Show off your stuff!	77	408	by comeonovercn Mon May 18, 2015 9:02 am

LOGIN • REGISTER

Username:  Password:  Log me on automatically each visit

Figure 1.4: LulzBot user discussion forum, [forum.lulzbot.com](http://forum.lulzbot.com)

Project Dashboard

<b>TAZ 3</b> 	<b>TAZ 5</b> 	<b>Add Ons</b> 	<b>KITTAZ</b> 	<b>TAZ 4</b> 
Project set for TAZ 3.1 	Instructions on how to assemble a TAZ 5. 	Instructions for printer add ons or upgrades 	Project set for construction of a Guava printer 	Project set for construction of a Guava printer 

<b>Mini</b> 	<b>Service Bulletins</b> 	<b>Maintenance and Repairs</b> 	<b>Calibration</b> 	<b>Firmware Flashing</b> 
Instructions on how to build a Lulzbot Mini. 	Instructions and guides for maintaining and replacing items. 	Instructions and guides for maintaining and replacing items. 	Instructions for calibrating extruders 	Guides on installing firmware on your 3D printer 

Figure 1.5: Open Hardware Assembly Instructions Kit, [ohai-kit.alephobjects.com](http://ohai-kit.alephobjects.com)

## Surveys

<https://survey.alephobjects.com> — Surveys.

## Rsync

[rsync://rsync.alephobjects.com](https://rsync.alephobjects.com) — Rsync file server of download and development archives.

## 1.3 Employee Services

These are URLs that are for Aleph Objects employee use.

### Website Analytics

<https://analytics.alephobjects.com> — Website analytics.

When website users go to various Aleph Objects websites, such as lulzbot.com, they also pass info about the visit to the analytics server. The collected data is not public (at present).

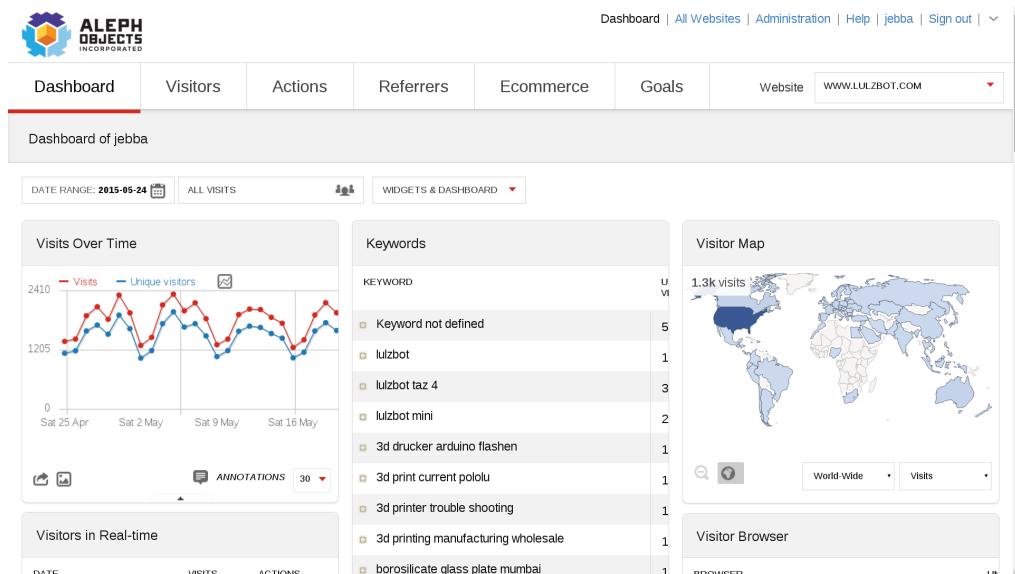


Figure 1.6: Aleph Objects analytics, [analytics.alephobjects.com](https://analytics.alephobjects.com)

### 1.3. EMPLOYEE SERVICES

#### Webmail Server

<https://aomail.alephobjects.com> — Webmail server.

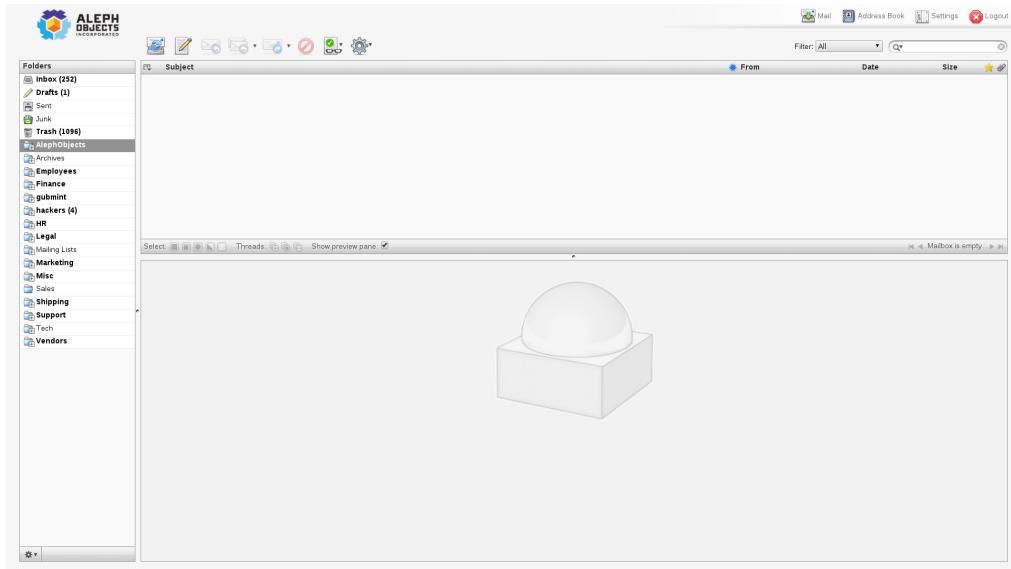


Figure 1.7: Aleph Objects Web Mail, [aomail.alephobjects.com](https://aomail.alephobjects.com)

#### Backup Server

<https://belly1.alephobjects.com> — Backup server.

#### ERP Server

<https://erp.alephobjects.com> — ERP server.

#### Network Monitoring

<https://ops.alephobjects.com> — Network monitoring.

#### Project Tracking

<https://projects.alephobjects.com> — Project tracking.

This is a new system for us, it isn't heavily used (yet).

## Information Technology

The screenshot shows the Aleph Objects ERP Server interface. The top navigation bar includes links for Home, Sales, Project, Accounting, Purchases, Warehouse, Manufacturing, Marketing, Human Resources, Knowledge, Reporting, Settings, and Technical. A user profile for 'Jeff Moe' is visible in the top right. The main content area is titled 'Locations' with a 'Create or Import' button. A search bar shows 'Internal'. A table lists various locations with their names and types. The left sidebar contains a navigation tree with categories like Receive/Deliver By Orders, Traceability, Inventory Control, Schedulers, Products, Configuration, and Locations (which is currently selected). The footer indicates the system is 'Powered by OpenERP'.

Location Name	Location Type
Physical Locations / Aleph Objects, Inc. / AM	Internal Location
Physical Locations / Aleph Objects, Inc. / AM / Cluster	Internal Location
Physical Locations / Aleph Objects, Inc. / AM / Office	Internal Location
Physical Locations / Aleph Objects, Inc. / AM / R&D	Internal Location
Physical Locations / Aleph Objects, Inc. / AM / Retail	Internal Location
Physical Locations / Aleph Objects, Inc. / AM / Sales	Internal Location
Physical Locations / Aleph Objects, Inc. / HQ	Internal Location
Physical Locations / Amazon EU	Internal Location
Physical Locations / Kangaroo	Internal Location
Physical Locations / Output	Internal Location
Physical Locations / Shipwire	Internal Location
Physical Locations / Shipwire / Shipwire-Chicago	Internal Location
Physical Locations / Shipwire / Shipwire-Hong Kong	Internal Location
Physical Locations / Shipwire / Shipwire-London	Internal Location
Physical Locations / Shipwire / Shipwire-Los Angeles	Internal Location
Physical Locations / Shipwire / Shipwire-Philadelphia	Internal Location
Physical Locations / Shipwire / Shipwire-Toronto	Internal Location
Physical Locations / Shipwire / Shipwire-Vancouver	Internal Location
DO-NOT-USEPhysical Locations / Shipwire / Shipwire-Philadelphia	Internal Location

Figure 1.8: Aleph Objects ERP Server, [erp.alephobjects.com](http://erp.alephobjects.com)

The screenshot shows the Aleph Objects Opsview Monitoring interface. The top navigation bar includes links for monitoring, modules, settings, and help. A search bar shows 'jebba'. The main content area displays a 'Host Group Summary' for 'Opsview'. It shows four host groups: 'Ealph Mountain', 'Elastichosts Dallas', 'Elastichosts LAX', and 'Monitoring Servers'. Each group has a status summary with 'Handled' and 'Unhandled' counts for both host and service status. Below this is a 'Totals' summary. The interface uses green, yellow, and orange colors to indicate different status levels. The footer shows the URL 'ops.alephobjects.com'.

Host Group	Host Status Totals		Service Status Totals	
	Handled	Unhandled	Handled	Unhandled
Ealph Mountain	11 UP		109 OK	
Elastichosts Dallas	5 UP		74 OK	1 WARNING
Elastichosts LAX	15 UP		220 OK	2 WARNING 8 UNKNOWN
Monitoring Servers	1 UP		29 OK	
Totals	32		432	11
	32 UP		432 OK	
			3 WARNING	
			8 UNKNOWN	
	32		443	

Figure 1.9: Aleph Objects Opsview Monitoring, [ops.alephobjects.com](http://ops.alephobjects.com)

## Wiki

<https://wiki.alephobjects.com> — Development wiki.

## 1.4. WORKSTATIONS

The screenshot shows the OpenProject web interface. At the top, there's a navigation bar with links for 'My page', 'Projects', 'Modules', a search bar, 'Help', and a user profile for 'Jeff Moe'. Below the header, a breadcrumb trail shows the path: 'Projects > 3D Scanner'. The main content area is titled 'PROJECTS' and lists several projects under the heading '3D Scanner': 'ESOP', 'Filament' (with sub-items 'Taulman 910' and 'Taulman BluPrint'), 'lulzbot.com v2 Updates', 'lulzbot.com v3' (described as the main project for moving lulzbot.com from Ubercart to Commerce), 'Mattercontrol Touch', 'Part Products' (described as including any individual printer parts), and 'The next TAZ printer'. A note at the bottom indicates that this project set includes any individual printer parts. There's also a link to 'Atom'.

Figure 1.10: Aleph Objects Project Tracking, [projects.alephobjects.com](http://projects.alephobjects.com)

## 1.4 Workstations

All workstations run **Debian** stable, version 8, codename **Jessie**.

Graphical User Interface (GUI) Applications

**ARandR**

ARandR allows you to configure a second monitor.

**Arduino**

Arduino is a series of free hardware controller boards and free software development tools. The software application “Arduino” is used to compile firmware for LulzBot 3D printers. The controller board used in LulzBots is derived from Arduino hardware.

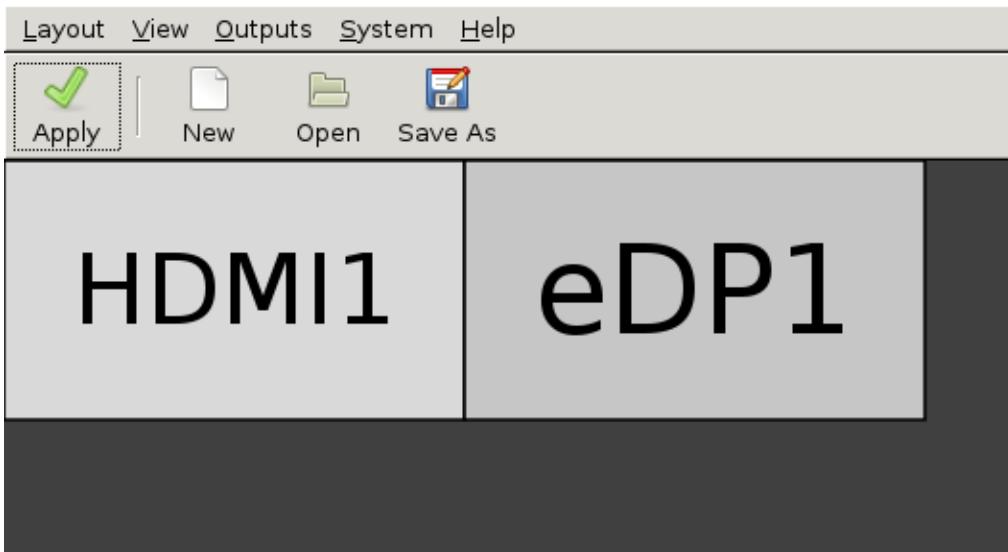


Figure 1.11: ARandR, configure second monitor

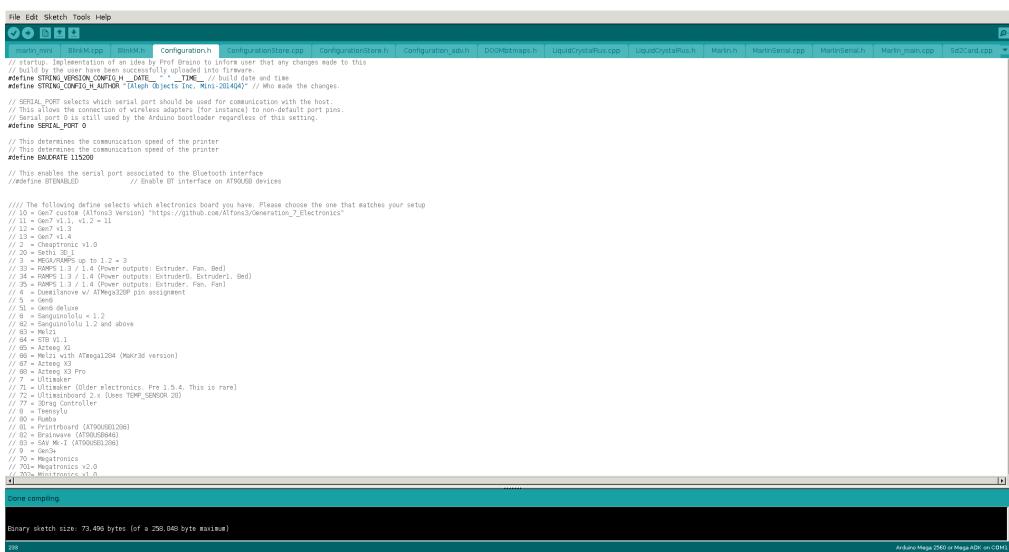


Figure 1.12: Arduino, compile LulzBot 3D printer firmware

# Audacity

Audacity is a multi-track audio editor for GNU/Linux. It is designed for easy recording, playing and editing of digital audio. Audacity features

## 1.4. WORKSTATIONS

digital effects and spectrum analysis tools. Editing is very fast and provides unlimited undo/redo.

Supported file formats include Ogg Vorbis, WAV, AIFF, and AU.

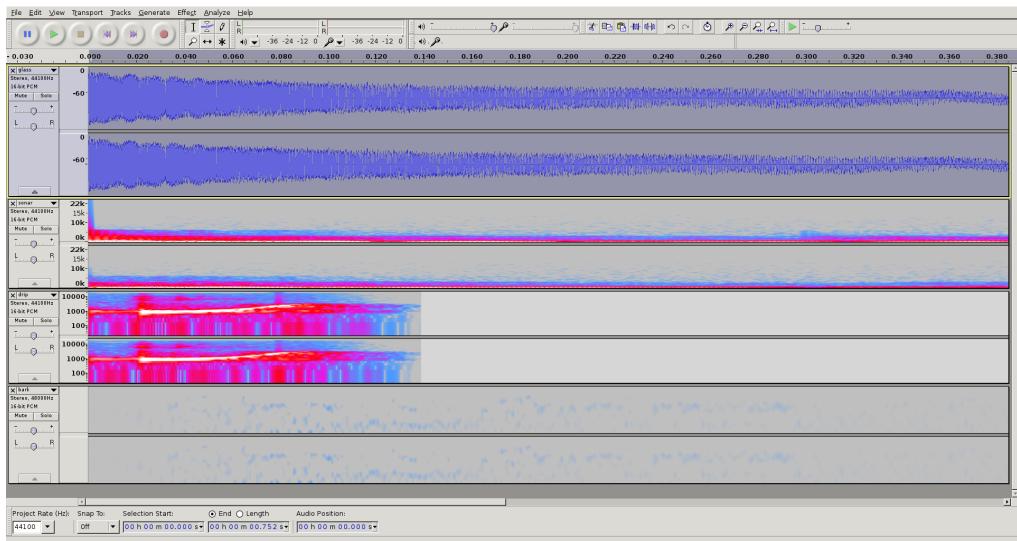


Figure 1.13: Audacity audio editor

## Blender

Blender is a 3D CAD application that can be used to make 3D printable objects.

Blender is an integrated 3d suite for modelling, animation, rendering, post-production, interactive creation and playback (games).

## Chromium

Web browser that aims to build a safer, faster, and more stable internet browsing experience.

## LulzBot Cura

LulzBot Cura is the main slicer and 3D printer control software for LulzBot 3D printers.

## Information Technology

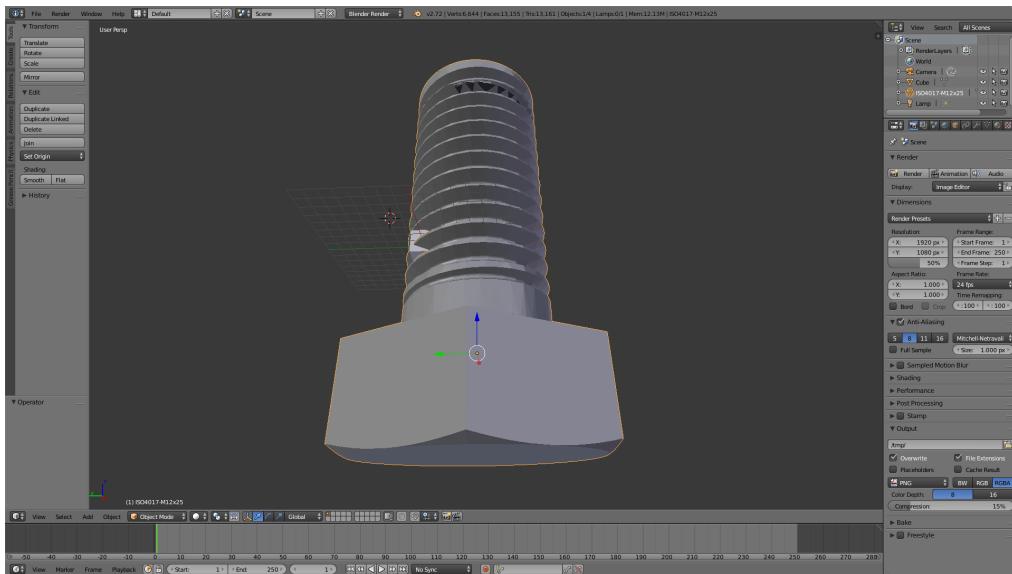


Figure 1.14: Blender 3D CAD

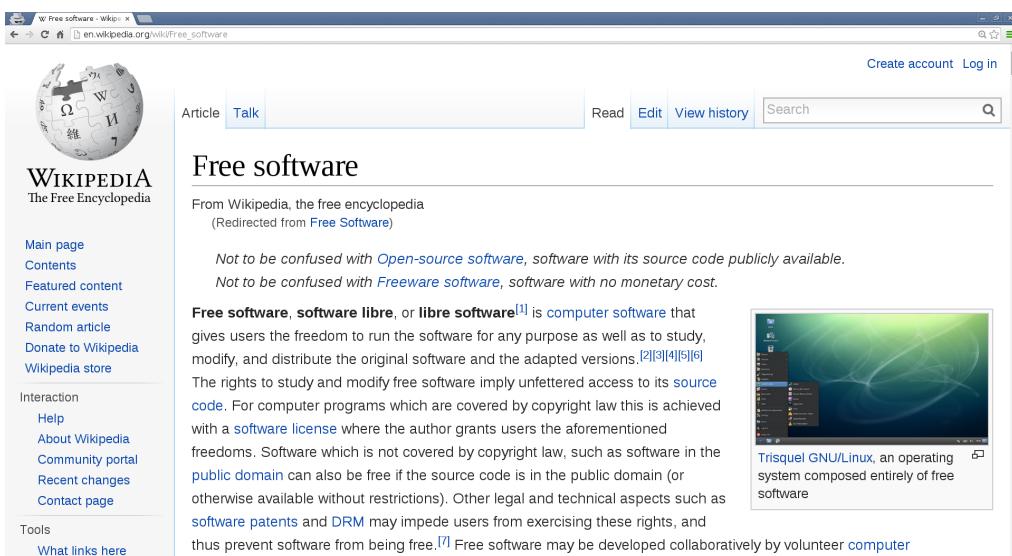


Figure 1.15: Chromium web browser viewing Wikipedia

## Epiphany

Epiphany is a simple yet powerful web browser targeted at non-technical users. Its principles are simplicity and standards compliance.

## 1.4. WORKSTATIONS

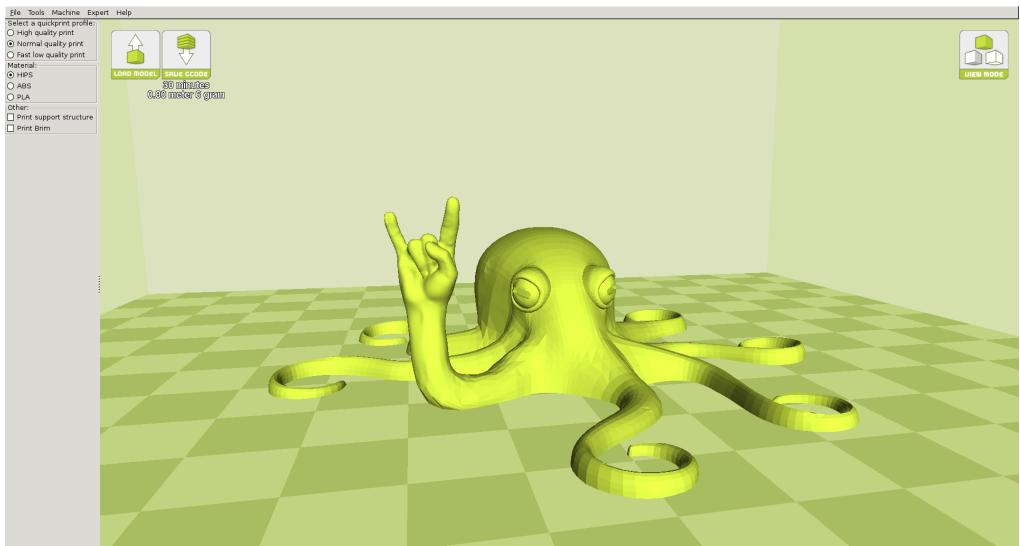


Figure 1.16: LulzBot Cura 3D printer control software

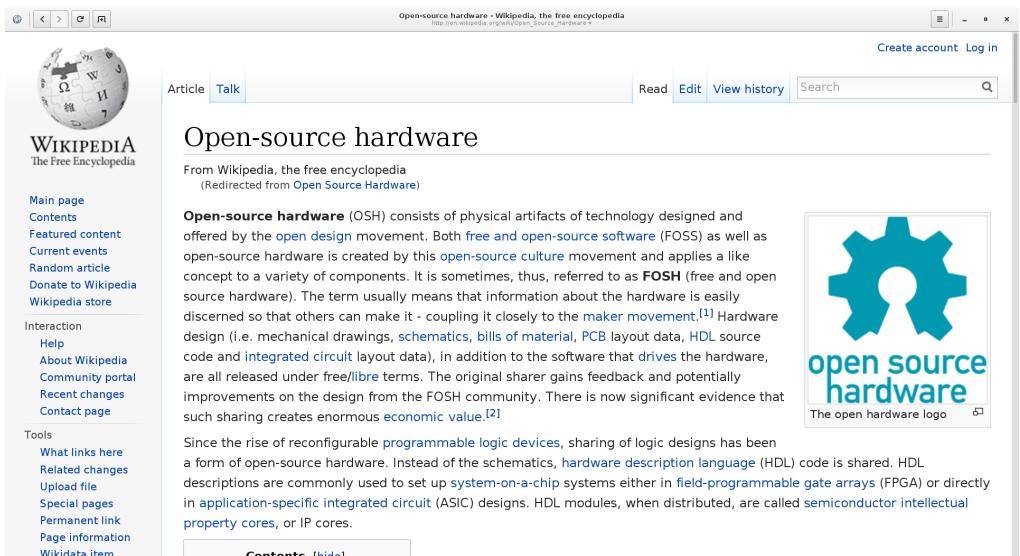


Figure 1.17: Epiphany web browser viewing Wikipedia

## Evince

Evince is a simple multi-page document viewer. It can display and print PostScript (PS), Encapsulated PostScript (EPS), DjVu, DVI, Portable

Document Format (PDF) and XML Paper Specification (XPS) files. When supported by the document, it also allows searching for text, copying text to the clipboard, hypertext navigation, and table-of-contents bookmarks.

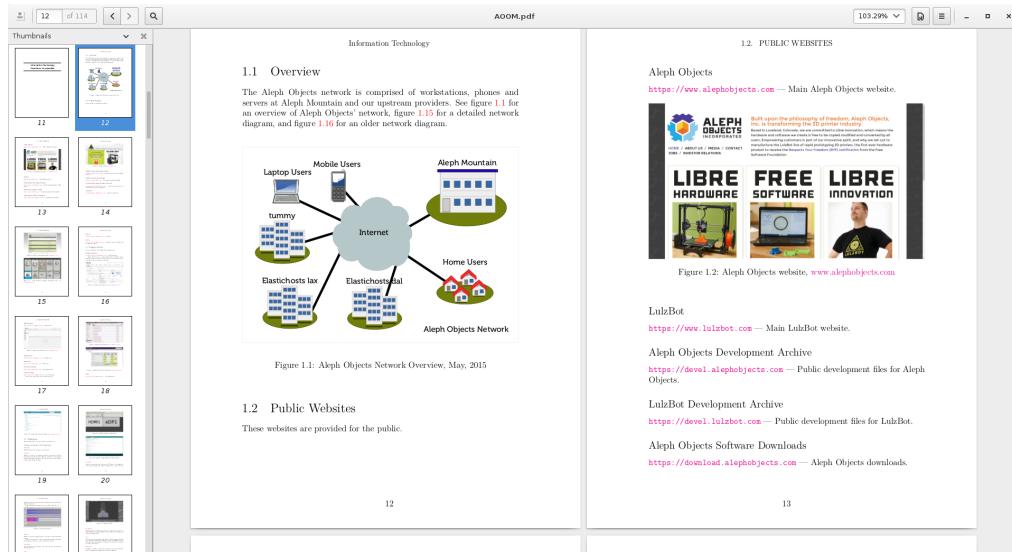


Figure 1.18: Evince PDF viewer viewing AOOM

## File-Roller

File-roller is an archive manager. It allows you to:

- Create and modify archives.
- View the content of an archive.
- View a file contained in an archive.
- Extract files from the archive.

File-roller supports the following formats:

- Tar (.tar) archives, including those compressed with gzip (.tar.gz, .tgz), bzip (.tar.bz, .tbz), bzip2 (.tar.bz2, .tbz2), compress (.tar.Z, .taz), lzip (.tar.lz, .tlz), lzop (.tar.lzo, .tzo), lzma (.tar.lzma) and xz (.tar.xz)

## 1.4. WORKSTATIONS

- Zip archives (.zip)
- Jar archives (.jar, ear, war)
- 7z archives (.7z)
- iso9660 CD images (.iso)
- Lha archives (.lzh)
- Archiver archives (.ar)
- Comic book archives (.cbz)
- Single files compressed with gzip (.gz), bzip (.bz), bzip2 (.bz2), compress (.Z), lzip (.lz), lzop (.lzo), lzma (.lzma) and xz (.xz)

File-roller can extract following formats:

- Cabinet archives (.cab)
- Debian binary packages (.deb)
- Xar archives (.xar)

File-roller doesn't perform archive operations by itself, but relies on standard tools for this.

## FreeCAD

FreeCAD is a 3D CAD application. It can make objects suitable for 3D printing. It is used to design many parts on LulzBot 3D printers.

## Galculator

Galculator is a calculator.

## Gedit

gedit is a text editor which supports most standard editor features, extending this basic functionality with other features.

Its core feature set includes syntax highlighting of source code, auto indentation and printing and print preview support.

## Information Technology

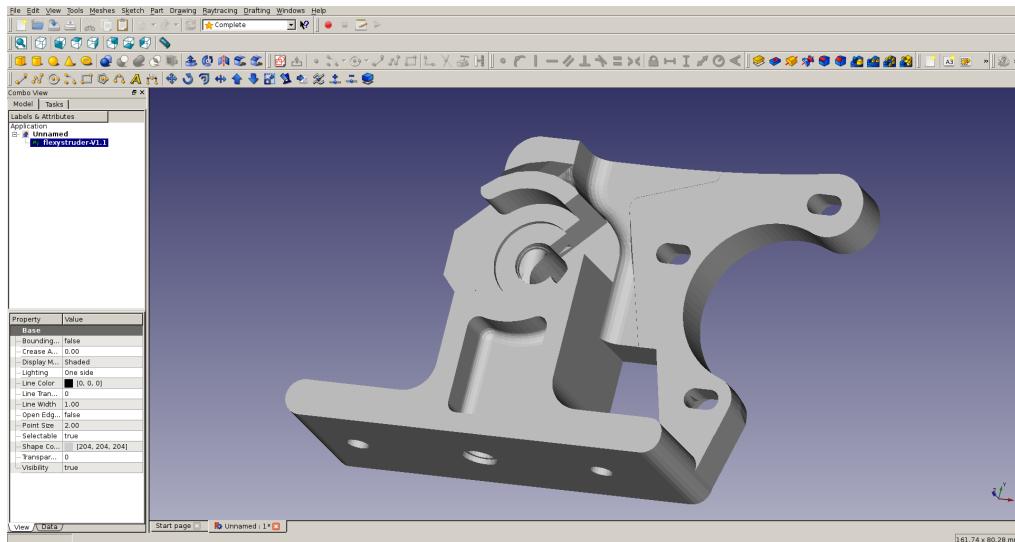


Figure 1.19: FreeCAD

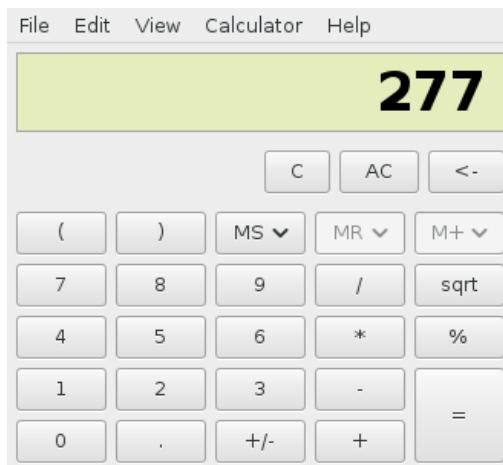


Figure 1.20: Calculator

## Geeqie

Geeqie is a browser for graphics files offering single click viewing. It includes thumbnail view, zoom, filtering features, and external editor support.

### GIMP

GIMP is an advanced picture editor. You can use it to edit, enhance, and retouch photos and scans, create drawings, and make your own images. It has a large collection of professional-level editing tools and filters. Numerous fine-control settings and features like layers, paths, masks, and scripting give you total control over your images.

### gLabels

gLabels is a lightweight program for creating labels, barcodes, business cards and media covers. It is designed to work with various laser/ink-jet peel-off label and business card sheets that you'll find at most office supply stores.

gLabels also supports mail merge from sources such as CSV files, vCards.

### GNOME Color Manager

GNOME Color Manager is a set of graphical utilities for color management.

### GNOME Screenshot

Screenshots can also be taken thusly, and by default will be written to the **Pictures** directory.

1. **ALT-F2** — to bring up a command dialog in the middle of the screen
2. **gnome-screenshot**

Useful options to **gnome-screenshot**

- **-w** — just take a picture of the window, not the whole desktop.
- **-f** — specify a filename to write.
- **-d** — delay a specified number of seconds before taking a snapshot.
- **-B** — omit window border.

Examples:

- `gnome-screenshot -d 2 -f ao-screen.png`
- `gnome-screenshot -w -B -f screen-calculator.png`

## GNOOME Terminal

GNOOME Terminal is a terminal emulation application that you can use to access the GNU/Linux shell.

## gscan2pdf

gscan2pdf is a 2D scanner application for the office scanners. See also simple-scan.

Only five clicks are required to scan several pages and then save all or a selection as a PDF file, including metadata if required.

gscan2pdf can control regular or sheet-fed (ADF) scanners and can scan multiple pages at once. It presents a thumbnail view of scanned pages, and permits simple operations such as cropping, rotating and deleting pages.

The resulting document may be saved as a PDF or single page image file.

## Icedove

Icedove is a mail client. It supports different mail accounts (IMAP), has an integrated learning Spam filter, and offers easy organization of mails with tagging and virtual folders.

Icedove is Thunderbird mail client, rebranded.

## Iceweasel

Iceweasel is a powerful, extensible web browser with support for modern web application technologies.

Iceweasel is Firefox, rebranded.

## Inkscape

Inkscape is an illustration editor which has everything needed to create professional-quality computer art. You can use it to make diagrams and

## 1.4. WORKSTATIONS

illustrations, technical drawings, web graphics, clip art, icons and logos. A collection of hands-on tutorials show you how to combine lines, shapes and text of different types and styles to build up a picture.

A selection of powerful vector graphics editing tools comes as standard. There is excellent support for paths, gradients, layers, alpha transparency and text flow control. An extensive library of filters allow you to apply realistic effects and extensions allow you to work with bitmaps, barcodes and printing marks, amongst other things.

Most of the common vector formats are supported, including PDF, and it has unrivalled support for the SVG web graphics standard.

### Istanbul

Istanbul is a desktop session recorder for the Free Desktop. It records your session into an Ogg Theora video file. To start the recording, you click on its icon in the notification area. To stop you click its icon again. It can make a screencast of the full screen or just of an area of the screen. It is even capable of recording audio from the default input channel.

### K3b

K3b provides a comfortable user interface to perform most CD/DVD burning tasks.

### Kdenlive

Kdenlive is a non-linear video editing suite, which supports DV, HDV and much more formats.

Its main features are:

- Guides and marker for organizing timelines
- Copy and paste support for clips, effects and transitions
- Real time changes
- Video4Linux capture
- Screen grabbing
- Exporting to any by FFmpeg supported format

## Kicad

Kicad is a suite of programs for the creation of printed circuit boards. Kicad is the main Aleph Objects PCB editor for all future products.

It includes a schematic editor, a PCB layout tool, support tools and a 3D viewer to display a finished and fully populated PCB.

Kicad is made up of 5 main components:

- kicad — project manager
- eeschema — schematic editor
- pcbnew — PCB editor
- gerbview — GERBER viewer
- cvpcb — footprint selector for components

Libraries:

- Both eeschema and pcbnew have library managers and editors for their components and footprints
- You can easily create, edit, delete and exchange library items
- Documentation files can be associated with components, footprints and key words, allowing a fast search by function
- Very large libraries are available for schematic components and footprints
- Most components have corresponding 3D models

## Klavaro

Klavaro is a simple tutor to teach correct typing. Aleph Objects uses it for typing tests.

### LibreOffice

LibreOffice is a full-featured office productivity suite.

These are all the components of LibreOffice:

- LibreOffice Writer: Word processor
- LibreOffice Calc: Spreadsheet
- LibreOffice Impress: Presentation
- LibreOffice Draw: Drawing
- LibreOffice Base: Database
- LibreOffice Math: Equation editor

### MeshLab

MeshLab can be used to clean 3D files, such as STL, before printing.

MeshLab is a free software, portable, and extendible system for the processing and editing of unstructured 3D triangular meshes. The system is aimed to help the processing of the typical not-so-small unstructured models arising in 3D scanning, providing a set of tools for editing, cleaning, healing, inspecting, rendering and converting this kind of meshes.

Meshlab can read files in these formats: PLY, STL, OFF, OBJ, 3DS, COLLADA and PTX. It can write PLY, STL, OFF, OBJ, 3DS, COLLADA, VRML, and DXF.

### Nautilus

Nautilus is a file manager. It allows users to browse directories, preview files and launch applications associated with them. It is also responsible for handling the icons on the desktop. It works on local and remote filesystems.

### OpenSCAD

OpenSCAD is a CAD application that can be used to create objects suitable for 3D Printing. It is used to create some parts for LulzBot 3D printers. The LulzBot Prusa had many OpenSCAD parts.

OpenSCAD is a software for creating solid 3D CAD objects. It focuses on CAD aspects rather than artistic ones.

OpenSCAD is not an interactive modeller. Instead it is something like a 3D-compiler that reads in a script file that describes the object and renders the 3D model from this script. This gives the designer full control over the modelling process and enables him to easily change any step in the modelling process or make designs that are defined by configurable parameters.

## OpenShot

OpenShot Video Editor is a free, open-source, non-linear video editor. It can create and edit videos and movies using many popular video, audio, and image formats.

Features include:

- Multiple tracks (layers)
- Compositing, image overlays, and watermarks
- Support for image sequences (rotoscoping)
- Key-frame animation
- Video and audio effects (chroma-key)
- Transitions (lumas and masks)
- 3D animation (titles and physics simulations)
- Chroma key (green screen and blue screen)
- Transcode (convert video encodings)
- Upload videos

## Pavucontrol

Pavucontrol is used when audio disappears on workstations. If a second monitor is connected to a workstation, audio can get routed to HDMI

## 1.4. WORKSTATIONS

instead of Analog Stereo (audio gets routed to the second monitor instead of the speakers). Pavucontrol is used to control the audio output channels.

PulseAudio Volume Control (pavucontrol) is a simple volume control tool (mixer). It allows you to control both the volume of hardware devices and of each playback stream separately. It also allows you to redirect a playback stream to another output device without interrupting playback.

### PCMan

PCMan File Manager features:

- Extremly fast and lightweight
- Can be started in one second on normal machine
- Tabbed browsing
- Drag and Drop support
- Files can be dragged among tabs
- Load large directories in reasonable time
- File association support (Default application)
- Basic thumbnail support
- Bookmarks support
- Handles non-UTF-8 encoded filenames correctly
- Provide icon view and detailed list view
- Standard compliant (Follows FreeDesktop.org)
- Clean and user-friendly interface
- Support GVFS for auto-mount handling on removable devices

### Pidgin

Pidgin is the main chat application used by Aleph Objects, using the XMPP (jabber) protocol. It is used with pidgin-otr to provide encryption.

It is also used to connect to IRC networks.

## Scribus

Scribus is a free software desktop page layout program with the aim of producing commercial grade output in PDF and Postscript.

Scribus can be used for many tasks; from brochure design to newspapers, magazines, newsletters and posters to technical documentation. It has sophisticated page layout features like precision placing and rotating of text and/or images on a page, manual kerning of type, bezier curves polygons, precision placement of objects, layering with RGB and CMYK custom colors. The Scribus document file format is XML-based.

Scribus supports professional DTP features, such as CMYK color and a color management system to soft proof images for high quality color printing, flexible PDF creation options, Encapsulated PostScript import/export and creation of 4 color separations, import of EPS/PS and SVG as native vector graphics, Unicode text including right to left scripts such as Arabic and Hebrew via freetype. Graphic formats which can be placed in Scribus as images include PDF, Encapsulated Post Script (eps), TIFF, JPEG, PNG and XPixMap(xpm), and any bitmap type supported by QT4.

Printing, PDF and SVG creation are done via custom driver libraries and plug-ins, giving Scribus inventive features: the abilities to include presentation effects with PDF output, fully scriptable interactive PDF forms, SVG vector file output. The internal printer drivers fully support Level 2 and Level 3/PDF 1.4 postscript features including transparency and font embedding.

## simple-scan

simple-scan is a 2D scanner application for the office scanners. See also gscan2pdf.

## Slic3r

Slic3r converts digital 3D models into printing instructions (G-code) for your 3D printer. It cuts the model into horizontal slices (layers), generates toolpaths to fill them and calculates the amount of material to be extruded.

Slic3r supports input in the STL, AMF and OBJ formats, and can output G-code for several series of 3D printers, including LulzBots.

## 1.4. WORKSTATIONS

It can be used with a graphical interface, or in batch mode via the command-line.

### Thunar

Thunar is a file manager. It has been designed to be fast and easy to use.

### VLC

VLC is the VideoLAN project's media player. It plays WebM, FLAC, Ogg/Vorbis files, podcasts, and multimedia streams from various network sources.

VLC can also be used as a streaming server that duplicates the stream it reads and multicasts them through the network to other clients, or serves them through HTTP.

VLC has support for on-the-fly transcoding of audio and video formats, either for broadcasting purposes or for movie format transformations.

### XFCE4 mixer

This is the mixer built into the desktop. It works in conjunction with pavucontrol.

### XFCE4 Screenshooter

Screenshooter is a screen shot utility the Desktop Environment. It can take desktop, rectangles or selected window screenshots, and you can bind it to your “Print Screen” key.

### Xournal

Xournal is an application for notetaking, sketching and keeping a journal using a stylus. It can also be used to add annotations to PDF files.

## Workstation Daemons

- Cron

- CUPS
- DHCP client
- GDM
- NTP

## 1.5 VoIP Phones

Aleph Objects uses Voice over IP (VoIP) phones for telephone calls. The telephones connect to an Asterisk server.

- Grandstream GXV3140
- Grandstream GXV3175
- Grandstream GXV3275
- Nexus 5

## 1.6 Mobile Cell Phones

Aleph Objects uses LG Nexus 5 mobile cell phones. We install **OmniROM**, replacing the manufacturer's version of Android. OmniROM is installed without any G\* applications.

The **F-Droid** application repository is added to the phones. It is a fully free software archive.

F-Droid installed Applications:

Barcode Scanner

CalDAV Sync Adapter

ConnectBot

Contact Owner

Conversations

Document Viewer

Document Viewer Font Pack

DuckDuckGo

Fennec FDroid

FreeOTP

Kontalk

LibreOffice Viewer Beta

SMSecure

Terminal Emulator

Tomdroid

VLC

## 1.7 Server Daemons

These are the server daemons used to drive the enterprise.

### ACPID

Monitors ACPI events. Runs on nearly all servers and workstations.

## Apache

Web daemon, used on many servers.

## Asterisk

Telephone server. DIDs (incoming), termination (outgoing), forwarding of calls, conferencing, voicemail, XMPP.

## Backups

tummy-backup backup server.

## BIND

Nameserver used for caching.

## botqueue

Print queue manager.

## buildd

Build service for compiling Debian packages.

## Calendar Server

Calendar (CalDAV) and contacts (CardDAV) server. CalDAV is used with mobile phones and icedove. No group calendars. CardDav is unused. Uses python-twisted.

Needs to be connected to or replaced by LDAP.

## cron

Scheduled triggering of applications (cf. at).

## DHCP

dnsmasq DHCP for 350+ hosts.

## DNS

dnsmasq DNS caching.

## Dovecot

IMAP mail services. Employees check their mail via the IMAP server, typically using icedove or aomail (roundcube using IMAP).

## Drupal

Main LulzBot site.

Used with [UberCart](#). Migrating to Drupal Commerce.

## exim

SMTP outgoing mail server, used by default in Debian. Used by some servers.

## Firewalls

OpenBSD's PF, authpf, Linux's iptables.

## fail2ban

Block out scripts, bots, crackers, and network noise on servers.

## Init

Init, woo!

## md RAID

Linux RAID, md, mdadm.

## Mediawiki

Test/development server for customer support.

## memcached

Used to speed up websites, such as Drupal.

## Motion

Motion detection for video camera system. Cameras are aggregated using motionEye.

## Munin

Network graphing.

## MySQL

Used on many servers for a database.

## NTP

Syncs time on every server and workstation.

## Odoo

Development ERP server, next generation of OpenERP.

## OpenERP

ERP server.

## OpenLDAP

LDAP server. Running, but not actively used. Daemon is slapd.

## OpenSSH

Used to control every server, create encrypted tunnels (autosh), mount filesystems (sshfs), and remote file transfer (sftp).

## OpenVPN

Connects external resources, such as employee mobiles and laptops, to the internal network.

## Opsview

Network monitoring (cf. nagios).

## Pentaho

Report server, connects to ERP.

## Piwik

Application to analyze web site traffic.

**Webalizer** is used occassionally.

## phpBB

User discussion forum.

## Postfix

Main SMTP outgoing mail server.

## Postgres

Database server.

## rsync

File server.

## rsyslog

Logging on every server and workstation.

## sendmail

SMTP outgoing mail server, used by default in OpenBSD.

## spamassassin

Spam filtering of email.

## sshfs

Main internal filesserver.

## systemd

System bootup and process manager.

## TFTP

Network install server.

## vsftpd

vsftpd FTP server for public facing download and devel servers.

## xinetd

xinetd on Debian systems. inetd on OpenBSD. Misc network utils.

## XMPP/jabber

ejabberd, Erlang XMPP (jabber) server.

## 1.8 Servers

In general, the servers are all running the latest stable release of Debian, Jessie, version 8, on the amd64 architecture. Some are running Wheezy because the daemon they hosts prefers it. There is some Debian Squeeze,

which is being migrated. The firewalls are OpenBSD. There is one CentOS and one Fedora machine.

All machines are backed up at least daily. Updates are run at least weekly, sooner depending on the nature of the update.

### Aleph Mountain Servers

This is a list of servers and nodes that are in the Aleph Mountain building.

- `abejas.alephobjects.com` — Apache, OpenERP.
- `amfw1.alephobjects.com` — OpenBSD, PF, authpf.
- `amfw2.alephobjects.com` — OpenBSD, PF.
- `aobuild1.alephobjects.com` — Compile/build server.
- `aocluster1.alephobjects.com` — 3D Printer cluster Botqueue server.
- `aodb.alephobjects.com` — Postgres.
- `aogfs1.alephobjects.com` — Test, potential fileserver.
- `aomds1.alephobjects.com` — Test, potential db server.
- `cam.alephobjects.com` — Motion, Motioneye video camera server.
- `jebstation.alephobjects.com` — sshfs file server.
- `tunk.alephobjects.com` — apt-cacher, OpenVPN server, dnsmasq (dhcp, dns cache, tftp), MySQL, OpenLDAP.

### Virtual Servers Elastichosts Los Angeles

These are machines “in the cloud”.

- `aomail.alephobjects.com` — Apache, Roundcube.
- `analytics.alephobjects.com` — Apache, Piwik, MySQL.
- `cal.alephobjects.com` — Calendarserver.

- `develdrupal.lulzbot.com` — Test server. Apache, Drupal, Ubercart, MySQL.
- `develerp.alephobjects.com` — Test server. OpenERP, Postgres.
- `dodev.alephobjects.com` — Test server. Odoo, Postgres.
- `drupalsql.lulzbot.com` — MySQL.
- `drupalsqlslave.lulzbot.com` — MySQL, Offline.
- `forum.lulzbot.com` — Apache, phpBB, MySQL.
- `jabber.alephobjects.com` — ejabberd.
- `ldap.alephobjects.com` — OpenLDAP.
- `ohai-kit.alephobjects.com` — Apache, OHAI-Kit, MySQL.
- `ops.alephobjects.com` — Apache, Opsview.
- `phplist.alephobjects.com` — Apache, phplist.
- `projects.alephobjects.com` — Apache, OpenProjects, MySQL.
- `survey.alephobjects.com` — Apache, LimeSurvey.
- `thinkup.alephobjects.com` — Apache, ThinkUp, MySQL, Offline.
- `www.lulzbot.com` — Apache, Drupal, Ubercart.
- `www.alephobjects.com` — Apache, HTML. :)

## Virtual Servers Elastichosts Dallas

These are machines “in the cloud”.

- `download.alephobjects.com` — Apache, vsftpd, rsyncd.
- `fone.alephobjects.com` — Asterisk.
- `mail.alephobjects.com` — Postfix, dovecot, spamassassin, MySQL.
- `wiki.alephobjects.com` — Test server. Apache, Mediawiki, MySQL.

## Tummy Servers

The CentOS server at Tummy.

- `belly1.alephobjects.com` — Tummy Backup server.

## 1.9 3D Printer Cluster

There are 144 printers in the 3D printing cluster. One hundred thirty five are in the main cluster room, nine in the adjoining sample room. The cluster is a mix of LulzBot TAZ and LulzBot Minis.

Each printer has a Beaglebone Black (BBB) connected to it via USB. The BBB is running Debian (armhf port) and Botqueue. There is a separate Botqueue server, also running Debian, that the BBBs connect to, to get print jobs.

The printers are organized in sets, or “pods”, typically of nine. Each cabinet holds nine machines, three wide by three high. Each pod is assigned a letter. In the main cluster room, this is A through O. In the sample room, it is pods Y and Z which have five and four machines, respectively. Machines are named of the format: `bbb-a1`, `bbb-a2`, through to `bbb-a9` for the first pod. Then the next pod starts `bbb-b1`, through to the end: `bbb-z4`.

List of printers:

- `bbb-a1.alephobjects.com` through `bbb-o9.alephobjects.com` — LulzBot TAZ.
- `bbb-y1.alephobjects.com` through `bbb-z4.alephobjects.com` — LulzBot Mini.

Links to upstream:

- [BeagleBone Black](#)
- [BotQueue](#)
- [Debian armhf](#)

## 1.10 Network

See figure 1.1 for an overview of Aleph Objects' network from May, 2015.

See figure 1.21 for a detailed Aleph Objects network diagram from 2015-05.

See figure 1.22 for an older Aleph Objects network diagram from February, 2014.

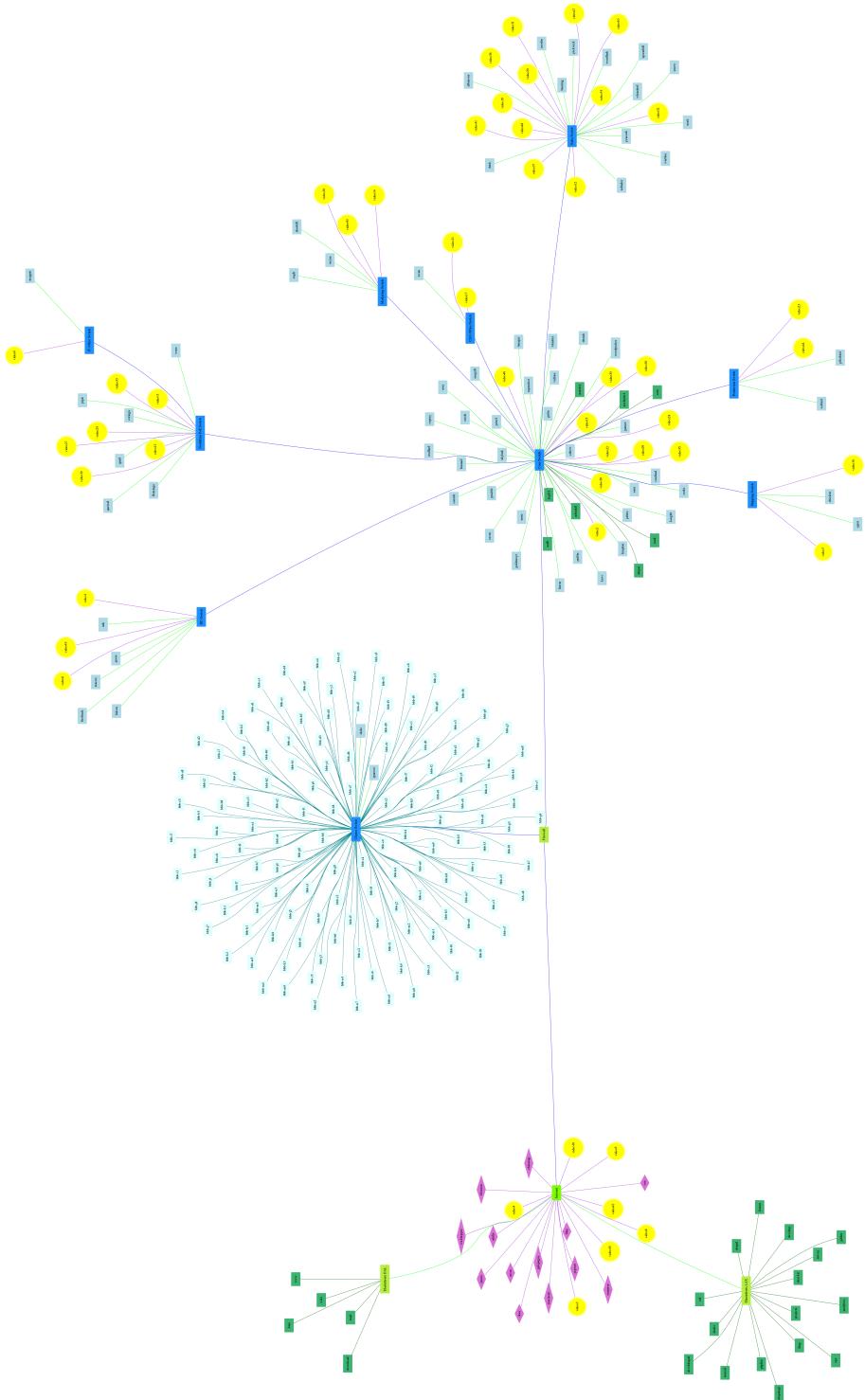


Figure 1.21: Aleph Objects Network Detail, May 2015

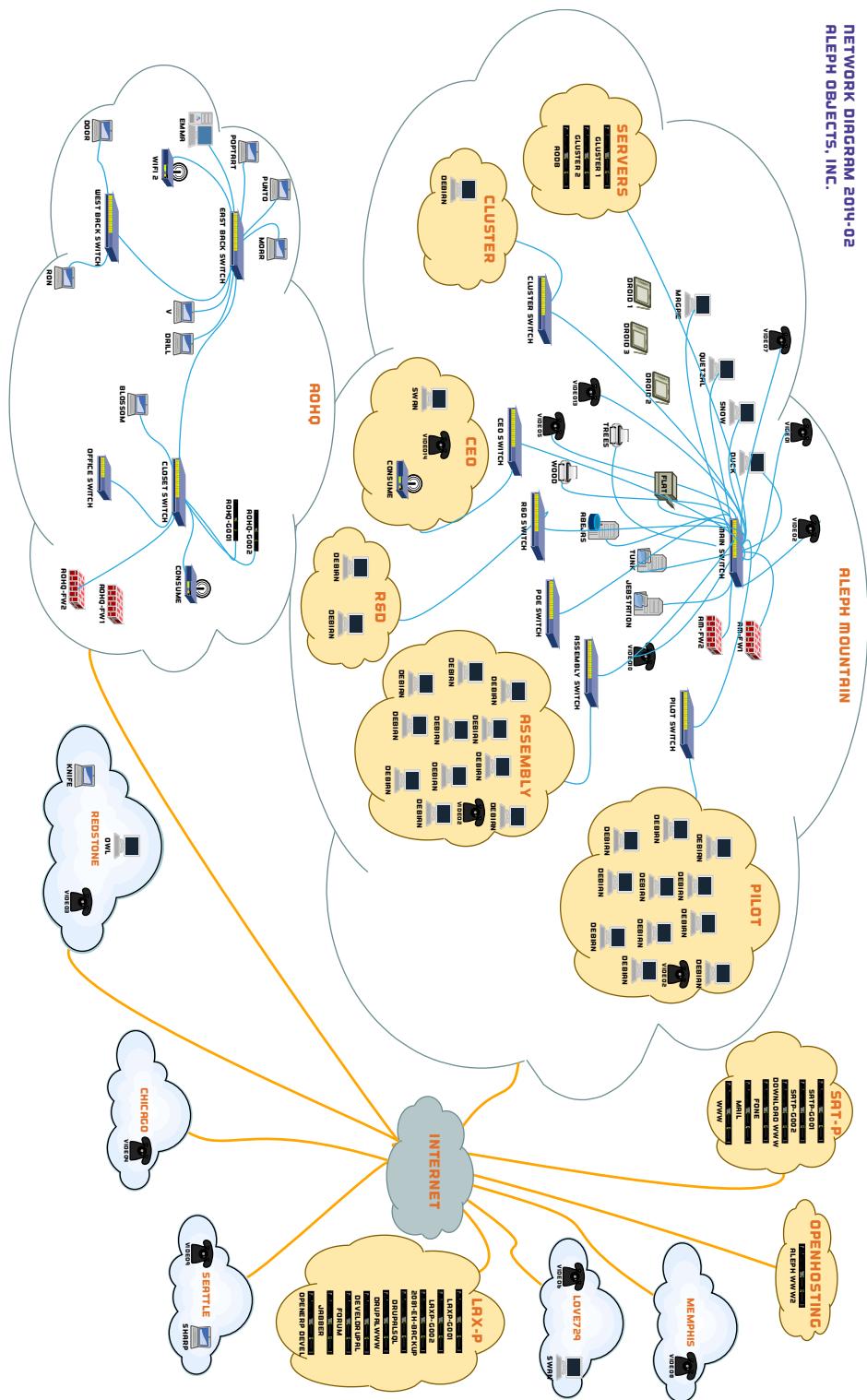


Figure 1.22: Aleph Objects Network Diagram, February 2014

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# **Customer Relations Management**

## **Phone, Email, Forum, Chat**

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## 2.1 Helpdesk

- Customer Support Representative (CSR): The front-line person who deals with the customer calls or emails.

### Requests Through Support Email

Emails to support@alephobjects.com are directly registered in OpenERP as Helpdesk request. The process to handle these is as follows:

1. Customer support person logs into OpenERP and opens the Helpdesk requests list by going to Sales/After-Sale Services/Helpdesk and Support.
2. By default, only the active items (new, pending, in progress) are shown in the list.

Query	Partner	Date	Deadlines	Responsible	Sales Team	Priority	Status
New Order at Listot		01/03/2014 2:29 PM				Normal	New
Senior Project		01/03/2014 2:19 PM				Normal	New
[PBM] New message 148 in mailbox 510		01/03/2014 1:55 PM				Normal	New
TAZ 2.1 heater		01/02/2014 8:40 AM				Normal	Pending
Purchase Order EHG755601 Version 1		01/02/2014 5:50 AM				Normal	In Progress
AO-100 doesn't startup		01/01/2014 3:55 PM				Normal	Pending
Issue with TAZ 2.1 End Stop Switch		12/31/2013 2:10 PM				Normal	Pending

3. Additional filters can be applied using the search / filter feature in OpenERP.
4. Open the Helpdesk request (or ticket hereafter).
5. Review the request and take appropriate action
  - a) If the request is for information or a simple issue that can be resolved by the customer support person, do so.
    - i. Assign self as “Responsible” person on the ticket.
    - ii. Record the resolution in the “send a message”

## 2.1. HELPDESK

- iii. Email with the resolution will be sent to the requester
  - iv. Set Reference field to “Product” and select a product (typically a printer – e.g. TAZ Printer 2.0)
  - v. Click on “Open” to set the state to “In Progress” and save the ticket.
- b) If the request needs to be worked upon before resolution, assign the request to appropriate person for resolution.
- i. Assign the person
  - ii. Set category of the problem
  - iii. Set priority for the problem resolution
  - iv. Set Reference field to “Product” and select a product (typically a printer – e.g. TAZ Printer 2.0)
  - v. Click on “Open” to set the state to “In Progress” and save the ticket.
  - vi. If required, send an email to the reporter by using “Send a message” from the chatter area (the area below the Helpdesk request form).
  - vii. Use “Log a note” if you wish to record your observations / queries to the responsible person working on the ticket. This information will be retained internally and will not be emailed to the reporter. Note: If the request is based on an order (sale order, delivery order), then use the Reference2 field to pick the sale order / delivery order and select the sale order for the customer reporting the problem.
6. Reviewing In-Progress/Pending items: Periodically review these tickets and provide updates to the customer by using “Send a message.”
7. Closing tickets: Once the resolution is accepted by the customer (you may not hear the success of the resolution from the customer always – so closing resolved cases after a gestation period is OK). If the customer responds to a resolution on a closed ticket, the ticket will be reopened for your review automatically allowing the ticket to be reopened or closed/cancelled.
8. Cancelling tickets: If the ticket is a spam or made for testing purposes, it can be cancelled by clicking on the Cancel Case button.

## Requests through Phone / Direct Email

The only difference in this is that the Helpdesk request (ticket) does not exist in the system and so it must be created.

1. On receiving a phone call from a customer, customer support person logs into OpenERP and opens the Helpdesk requests list by going to Sales/After-Sale Services/Helpdesk and Support.
2. Click on Create button to create a new request.
3. Select the partner from the list of available partners. If the call is from a person not registered as a customer with Aleph Objects, record the information in the notes section – name, phone number, address and other pertinent details of the customer.
4. Record the email address of the caller.
5. Write a brief summary header in the “Query” field.
6. Based on your assessment of the call, set the priority of the call and the category.
7. Continue processing the ticket following the procedure outlined for the automated email (to support@alephobjects.com) ticket. Note: Process Helpdesk requests in personal emails in the same manner as a call.

## 2.2 Using the Phones

See: `shared-j/Documents/phone_directory.txt` for the most current company phone directory.

### Transfer call

1. Ask the caller if you can transfer them.
2. Put the call on hold: \*2
3. Dial internal extension number you want to transfer to.

### 2.3. FORUM

4. Explain transfer when internal callee answers.
5. Hang up, and the call will automatically transfer.

## 2.3 Forum

Answer questions and contribute information at our LulzBot forum:  
<http://forum.lulzbot.com/>

## 2.4 RMA

Return Merchandise Authorization. Through OpenERP.

## 2.5 Chat

Chat server at <jabber.alephobjects.com>



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# **Human Resources**

## **Us**

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### 3.1 Professional Employment Organizations (PEO)

Insperity.

### 3.2 Employee Benefits

See employee handbook at <http://esc.insperity.com>

### 3.3 Logging hours in OpenERP

For hourly Insperity employees:

OpenERP —> Human Resources —> Attendances —> Attendances

For hourly Kelly employees, track your hours on Kelly's website.

### 3.4 Requesting time off in OpenERP

OpenERP —> Human Resources —> Leaves —> Leave Requests

### 3.5 Recruitment / Interviewing

Kelly, Insperity, JobZology.

### 3.6 Performance

Insperity.

### 3.7 Training

Certifications.

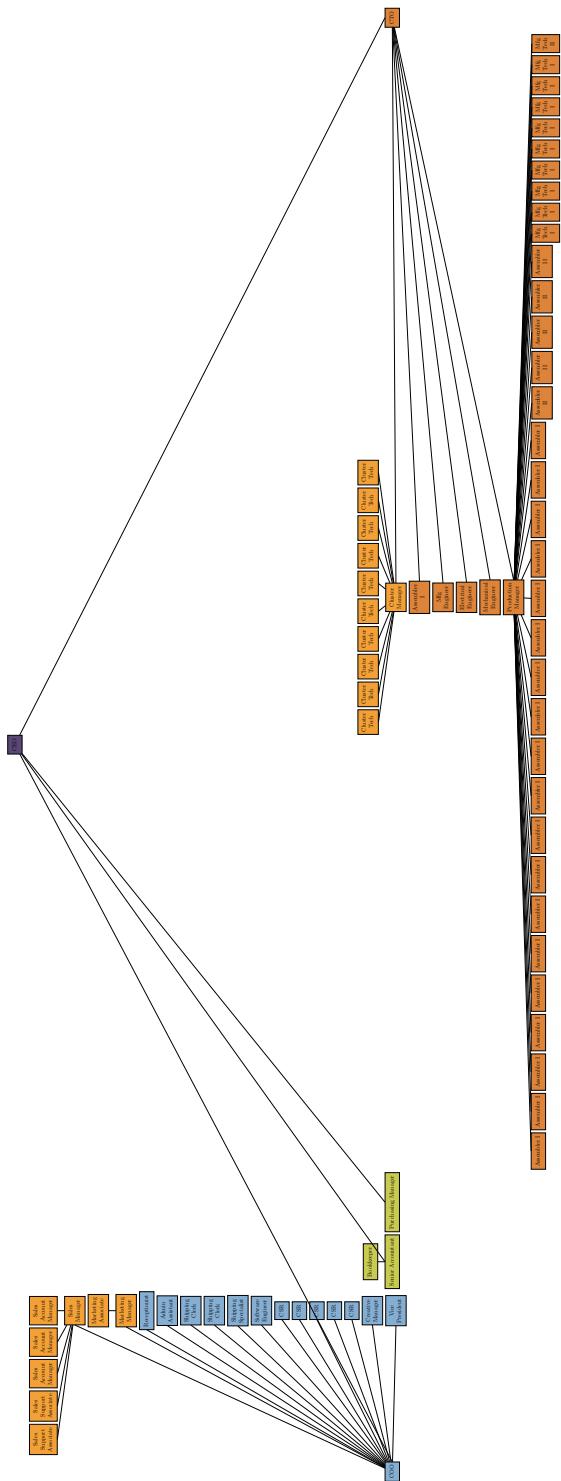


Figure 3.1: Organizational Chart

## 3.8 Organizational Chart

See figure 3.1 for Aleph Object's organizational chart.

See figure 3.2 for Aleph Object's organizational chart in dot.

## 3.9 Schedules

The following calendars list when there are recurring meetings.

See figure 3.3 for Aleph Object's weekly meeting schedule.

See figure 3.4 for Aleph Object's monthly company meeting schedule.

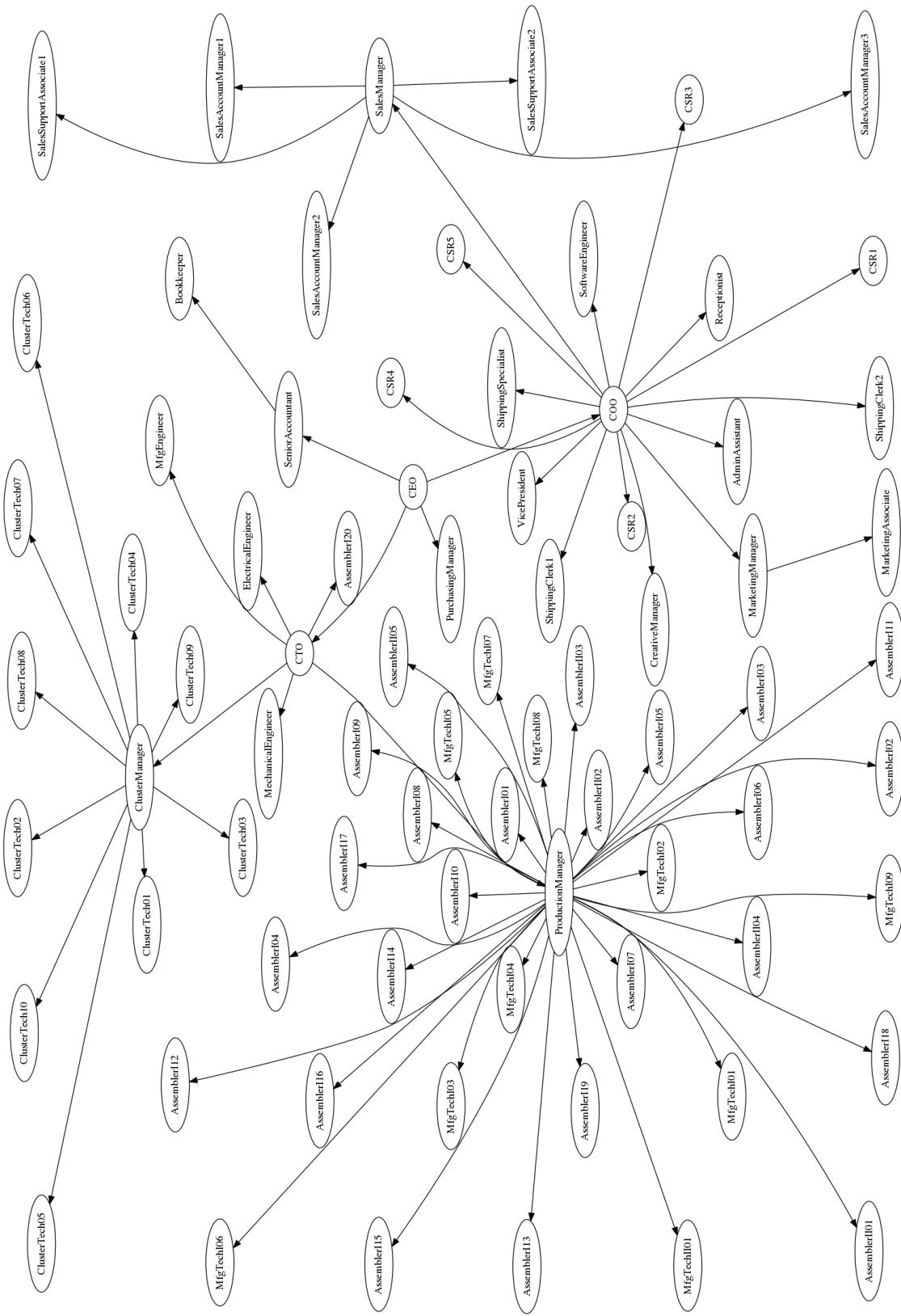


Figure 3.2: Aleph Objects Org Chart dot

Monday	Tuesday	Wednesday	Thursday	Friday
7am	New Employees			
8am				
9am	Manufacturing & Materials	Interviews	R & D	
10am			Cluster	
11am	Sales	IT		
12pm	Finance	Facility	Interviews & Reviews	Web Consulting
1pm	Shipping		HR	
2pm	Web Status	Marketing	PEO Call	Software Dev
3pm	Retail Purchasing	NPI	Web Working	Public Tours

Figure 3.3: Weekly Company Meetings

January							February							March						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
			1	2	3	4								1						1
5	6	7	8	9	10	11	2	3	4	5	6	7	8	2	3	4	5	6	7	8
12	13	14	15	16	17	18	9	10	11	12	13	14	15	9	10	11	12	13	14	15
19	20	21	22	23	24	25	16	17	18	19	20	21	22	16	17	18	19	20	21	22
26	27	28	29	30	31		23	24	25	26	27	28		23	24	25	26	27	28	29
														30	31					
April							May							June						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
		1	2	3	4	5					1	2	3	2	3	4	5	6	7	
6	7	8	9	10	11	12	4	5	6	7	8	9	10	8	9	10	11	12	13	14
13	14	15	16	17	18	19	11	12	13	14	15	16	17	15	16	17	18	19	20	21
20	21	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28
27	28	29	30				25	26	27	28	29	30	31	29	30					
July							August							September						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
		1	2	3	4	5						1	2	2	3	4	5	6		
6	7	8	9	10	11	12	3	4	5	6	7	8	9	7	8	9	10	11	12	13
13	14	15	16	17	18	19	10	11	12	13	14	15	16	14	15	16	17	18	19	20
20	21	22	23	24	25	26	17	18	19	20	21	22	23	21	22	23	24	25	26	27
27	28	29	30	31			24	25	26	27	28	29	30	28	29	30				
							31													
October							November							December						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
		1	2	3	4							1		1	2	3	4	5	6	
5	6	7	8	9	10	11	2	3	4	5	6	7	8	7	8	9	10	11	12	13
12	13	14	15	16	17	18	9	10	11	12	13	14	15	14	15	16	17	18	19	20
19	20	21	22	23	24	25	16	17	18	19	20	21	22	21	22	23	24	25	26	27
26	27	28	29	30	31		23	24	25	26	27	28	29	28	29	30	31			
							30													

2015

Figure 3.4: Monthly Company Meetings at 8:00AM MST



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# **Purchasing**

## **Buying and Receiving**

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## 4.1 Requester

1. Post the product request to the Product Requests Group.
  - a) From messaging, pick Product Requests from My Groups.
  - b) Click on the "send a message to the group" box.
  - c) Click on the icon on the top right corner of the message box with a hover info "Open the full mail composer"
  - d) Pick the "Internal Product Request" in the use template pick (bottom right corner of the popup)
  - e) Type the product request with the following information
    - Date Needed:
    - Name of Requester:
    - Internal Charge account code for PO:
    - Item description:
    - Quantity:
    - Estimated Cost:
    - Suggested supplier:
    - Supplier model/item number:
    - Purpose:
  - f) Click on the send button

Note: The product requests group by default includes all employees. The requester is any Aleph Objects employee. To make the request, the employee needs an OpenERP account.

2. If the materials planner or purchase approver requires additional information, they may reply to this message and it will show up in the requester's Inbox.

## 4.2 Materials Planner

This role creates the Purchase Quotation. The following steps are to be followed to generate a purchase quotation.

#### 4.2. MATERIALS PLANNER

1. Review the Purchase Requests message group for new product requests.
2. Note the details of the request and identify the product from the OpenERP product catalog – this is done by searching for the product from Purchases/Product/Product menu. This will only show products that have been marked "Can be purchased."
3. Create a new purchase quotation from Purchases/Purchase/Quotations.
4. Pick the supplier (this can be reviewed from the supplier list on the product identified in step 2)
5. Add supplier reference and source document.
6. Pick the product in the order lines and set the quantity and adjust unit price if it is different.
7. Add terms and conditions, payment terms, expected date to the RFQ.
8. Save RFQ.
9. Confirm the purchase order. If the order amount is less than 100, the order will be approved automatically. If not, the Purchase Order will wait for a second approval. Refer to Purchase Approver process before continuing with the next steps.
10. There are two types of purchase orders possible: The first is when the materials planner goes ahead and makes the purchase on his/her credit card and/or gets the material for immediate use. The second is when a formal order is placed with a supplier and the supplies / supplier invoice are awaited.
11. An incoming shipment document and a draft supplier invoice will be created on PO confirmation.
12. Option A: Purchase on Credit Card (Prepaid purchases)
  - a) The materials planner goes ahead and makes the purchase of the required materials and makes a payment using the credit/debit card. [Going to the nearest store or placing an order on the supplier website]

- b) If materials are purchased from a local store, the materials planner updates the receipt of goods in OpenERP. If purchase order is placed on the supplier website, the incoming shipment will be handled by the warehouse person on its arrival.
    - i. Go to Warehouse/ Receive/Deliver by Orders /Incoming Shipments.
    - ii. Select the incoming shipment document corresponding to the PO.
    - iii. Mark the goods as received.
    - iv. Create draft supplier invoice from incoming shipment / purchase order.
  - c) Turn in the details of the payment and the PO reference number to Accounting. Accounting Person continues with the workflow.
13. Option B: Placing purchase orders by email
- a) The materials planner confirms the purchase order. He/she then emails/faxes the PO to the supplier.
  - b) The warehouse person processes material receipt
    - i. Go to Warehouse/ Receive/Deliver by Orders /Incoming Shipments.
    - ii. Select the incoming shipment document corresponding to the PO.
    - iii. Mark the goods as received.
    - iv. Create draft supplier invoice from incoming shipment / purchase order.
  - c) Accounting Person continues with the workflow.

### 4.3 Purchase Approver

This role approves the RFQ by confirming it to become a purchase order. The approval step may be carried out by the Materials Planner based on the purchase amount rule [amount > 100].

1. The approver lists all Purchase Orders that are in “Waiting Approval” state.

#### 4.4. ACCOUNTING

2. The details of the PO are reviewed.
3. The approver can then confirm the PO to approve or set it back to “draft” state” to reject.
4. The materials planner will be notified for the approval state.

### 4.4 Accounting

This role manages the supplier invoice and payments to suppliers.

1. The warehouse person on the materials planning person has already created a draft supplier invoice.
2. On receipt of the incoming shipment note (Option B)/payment made (Option A), the accountant/book keeper adjusts the draft invoice and confirms the invoice.
3. The invoice is now ready for payment. The payment can be processed in a few ways:
  - a) Click on Register Payment in the supplier invoice screen. Follow through on the wizard that pops up and record the payment. This method requires the actual check/payment processing to happen outside of OpenERP. The payment made will be adjusted with the current invoice even if there are pending payments to the supplier.
  - b) Click on Accounting/Supplier/Supplier Payment menu and create a new payment. Select the supplier. All pending payments will be listed and payment amount will be adjusted against the pending payments including the current one based on the amount and payment aging. This method is relevant and useful when payments to suppliers are batched.
  - c) Payment through checks generated in OpenERP. This section will be elaborated after the installation and configuration of check writing module.

## 4.5 Notes

1. Record conversations with the supplier during the negotiation if any along with the purchase order using “Log a Note” feature. If the information needs to reach the supplier then the “Send Message” option should be used.
2. Once the purchase order is confirmed the only changes allowed are to the text fields. The supplier, pricing details, product details are frozen and cannot be changed. Please review all the options before confirming the PO.

## 4.6 Products

A Product in OpenERP language, is anything you buy or sell.

OpenERP —> Purchases —> Products —> Products

## 4.7 Suppliers

A supplier is a Partner that we buy Products from.

OpenERP —> Purchases —> Purchase —> Supplier

## 4.8 Inventory

### Receiving

Keep track of what comes in, count it, track in OpenERP:

OpenERP —> Purchases —> Incoming Products —> Incoming Shipments

OpenERP —> Purchases —> Incoming Products —> Incoming Products

### Moves

OpenERP —> Warehouse —> Traceability —> Stock Moves

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## **Locations**

## **We Are Here**

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## 5.1 Aleph Mountain

## 5.2 Fulfillment

Retail

- Loveland, Colorado, USA

Amazon

- USA

Shipwire

- Chicago, Illinois, USA
- Philadelphia, Pennsylvania, USA
- Los Angeles, California, USA
- Toronto, Canada
- London, United Kingdom

Resellers

- Builders
- Drop Ship

## 5.3 Contract Manufacturers

## 5.4 Customer

## 5.5 Employee

## 5.6 Historical

- 2011 Redstone Canyon, Colorado, USA

## 5.6. HISTORICAL

- 2011 Fort Collins, Colorado, USA
- 2011-2014 AOHQ, Loveland, Colorado, USA



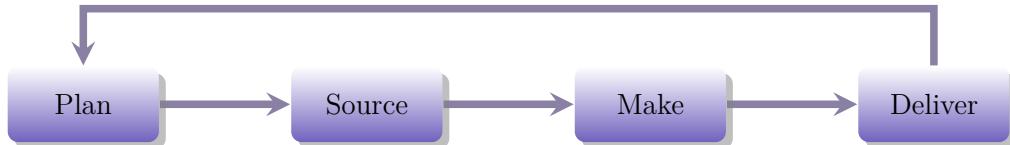
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**Manufacturing**

**Open Source Hardware**

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## 6.1 Supply Chain



## 6.2 Configuration

The manufacturing process requires a few configuration steps before it can be modeled in OpenERP.

### Product Definitions

Every product that is purchased, manufactured, sold, or valued as an assembly should be defined in OpenERP. The assets (computers, printers, furniture), consumables (stationery) may be defined in OpenERP but are not part of this document. Shipping and services need to be defined as well. The definition of a product should cover the following:

#### Product Definitions

##### Field

Description

##### Product Name

The descriptive name for the product. Keep as unique as possible.

##### Category

Select from existing category list. Do not leave it as "All Products."

See section below for creating new product categories

##### Can be sold

Set on all finished products, parts/consumables, sub-assemblies that can be sold. Do not set on intermediate sub-assemblies that are not sold.

##### Can be purchased

Set on all parts/consumables (category that includes filaments) that

## 6.2. CONFIGURATION

are purchased. Do not set on intermediate sub-assemblies that are not sold.

Can be expensed

Do not set on any of the products that have inventory valuation.

Information Tab

Product Type

”Stockable Product”. For shipping and service items, choose ”Service”

Unit of Measure

Select the most appropriate unit. This is the sale unit of measure.

Sale Price

This should be set for all items that are sold.

Is Shipwired

Check this flag on all items that are stocked at shipwire location. Failure to do so will result in the goods at those warehouses not tracked.

Internal Reference

Define the part number for the item. Set this for every item sold/purchased and intermediate sub-assembly items.

Schedule B#

Set this on every item that is sold.

EAN

Not required unless you have it for tracking

UPS

Set for every item that is stocked on shipwire locations.

Description

Detailed description of the product

Procurements Tab

Procurement Method

Define as "Make to Stock"

Supply Method

Set it as "Buy" for all "can be purchased items." Set it as "Manufacture" for all assemblies and final products.

Purchase requisition

Do not use

Cost Price

Set the purchase price (only if you do not have supplier pricing defined.)

Manufacturing Lead Time

Set this for all items that have Supply Method as "Manufacture."

Active

Uncheck this for items that are no longer required, that are duplicates.

Purchase Unit of Measure

Set this to the unit of measure used in purchasing the item.

Manufacturer

If manufacturer of the item is tracked, record this.

Manf. Product Name

If manufacturer of the item is tracked, record this.

Suppliers Tab

Supplier

Supplier name from the list of suppliers defined. Do not add suppliers from this form.

Supplier Product Name

Name used by the supplier for the product/item

Supplier Product Code

Code used by supplier for this product/item

## 6.2. CONFIGURATION

### Minimal quantity

If the supplier enforces a minimum quantity for purchase, set it here.

### Delivery lead time

Set this value to get an accurate estimation of manufacturing/procurement/delivery schedules

### Supplier Pricelist

Set this to record quantity based pricing

### Description for Suppliers

Set this item to show on RFQ/POs

## Inventory Tab

### Rack

Record location where the product is stored in the warehouse

### Row

Record location where the product is stored in the warehouse

### Case

Record location where the product is stored in the warehouse

## Accounting Tab

### Inventory Valuation

Defaults to "Real Time (automated)." Do not change this.

Do not set any account related information here as they will be used from the Product Category definition.

## Product Category

Product Category helps group products and define common information to be used on all the products. The following are the categories defined for Aleph Objects.

### Category Name

Description

## Manufacturing

### Printers

To group printers (finished products) that have Supply Method as "Manufacture."

### Parts

All other components that are bought and sold and goes into the manufacture of printers

### Shipping

Groups all shipping services

### Service

Groups all other services like consulting, labor

### Consumables

Filaments, tape and special category items. Do not record stationery, coffee cups and such in this category.

Each category must have the following fields set:

#### Field

Description

#### Parent Category

Choose "All Products"

#### Category Type

Choose "Normal"

#### Income Account

Each category is set to have its own income account. For new category, an income account must be created.

#### Expense Account

Each category is set to have its own expense account. For new category, an expense account must be created.

#### Stock Input Account

Set it to "14305 Goods Received"

#### Stock Output Account

Set it to "14395 Goods Delivered"

## 6.2. CONFIGURATION

Stock Valuation account

Set it to "14310 Products"

Stock Journal

Choose "Stock Journal (USD)"

Any new product category must be reviewed by Jeff and the financial consultants as many management budgets and reports are based on the standard five categories.

## Warehouses and Locations

- Warehouses and Locations: The required warehouse and locations are already in place. However, if there is a need to create a new warehouse, first create the location and then the warehouse.
- Location: Physical locations are where Aleph Objects stores and owns goods - AM, HQ, Shipwire locations.
- Shipwire locations need to have the shipwire location field selected. If a new shipwire location is needed, it needs to be in the ursa shipwire module and the module needs to be upgraded.
- RPC, OTM are sub-contract manufacturing locations of type Production.
- The internal production locations (AM Cluster, AM Main Assembly, AM Pilot Assembly, AM Pre-Sub) are virtual production locations.
- These production locations need to have stock valuation account mapped to "14350 Work In Progress."

## Routings and Work Centers

Routings

This is the flow of material/products in the assembly line. It consists of a number of steps (work center operations) in order to complete an assembly (a sub-assembly or a finished product). A routing requires a production location to be picked from the list of production locations (internal and sub-contracting) defined in the previous step.

Menu: Manufacturing/Products/Routings

1. Define a unique name for the routing. If a routing is defined for a specific product, use the name of the product in the routing name. This will add clarity.
2. Define a unique code for the routing.
3. Select production location (one of sub-contract or virtual production). Do not attempt to create a new location from this field. Always ensure that the location is defined before it is used.
4. Set the routing as active. [To make a routing redundant or not list, make active false]
5. Define Work center operations
  - a) Define Work Centers (next section)
  - b) Click on "Add an Item"
    - i. Define a name for the operation. E.g. Push dowel in plate
    - ii. Define a sequence. The sequence number sets the position of this operation in the routing.
    - iii. Pick the work center associated with the operation.
    - iv. Define number of cycles required for this operation in the routing. Typically, the number of cycles will be 1. In some cases, it is possible that the step be repeated.
    - v. Define number of hours for the operation (for the work in progress material/assembly/product at this step)
    - vi. Description: Provide information on the routing - instructions, specifications, etc. The notes tab may be used to capture more information if required.

Work Centers

Work centers are stations / tables / machines that are on the assembly line. It is also used to represent workers on the assembly line. For example, pressing a dowel in a plate is done at a press. So, the press is a work center. There is no need to identify the person on that work center - it will be done

## 6.2. CONFIGURATION

through the assignment of hours on the work center. Another example is a QC inspection work center which may be defined as a human.

Menu: Manufacturing/Configuration/Work Center

1. Define a unique name for the work center to avoid incorrect association with a routing.
2. Define resource type - material for machines/tables and human for pure labor (QC type of work centers)
3. Define a unique code for the work center. E.g. <Location>-<WC>-<#>
4. Define Working time: Pick the Aleph Working Time defined. If additional working time (calendar) is required, they can be created from Manufacturing/Configuration/Resources/Working Time
5. Define capacity information
  - a) Efficiency factor: A factor of 1.00 assumes 100% work center efficiency. This may be a good starting value if this information is not available.
  - b) Capacity per cycle: This field captures the number of units of finished products that are produced in a single run (or cycle). For e.g. some of the printed parts were produced at the rate of 4 per cycle, some were 2 and some were 1.
  - c) Time per cycle - Define how long it takes for one cycle to finish.
  - d) Time before prod. - Setup time for the work station
  - e) Time after prod. - Cleanup time for the work station
  - f) Define costing information
  - g) Work center product: Do not set. This allows the work centers to be generic (tables, machines, people) and be used in more than one product.
  - h) Cost per hour: Define the labor cost per hour on this work center.
  - i) Hour account: Set the analytic account (CHECK with financial consultant if this is required)

- j) Cost per cycle: Define the overhead cost for use of the machine
  - manf.overhead or direct cost?
- k) Cycle account: Set the analytic account (CHECK with financial consultant if this is required)
- l) Analytic Journal: Skip the field.
- m) General Account: Assign the expense account (Since this is direct labor costs, it should go into COGS group - CHECK with financial consultant on how to map this)

## Bill of Materials

Bill of Materials: Bill of materials is used to define the components in a finished product/assembly. It will also be used to disassemble finished components / packages / kits. Bill of Materials is necessary (required) for every finished product, sub-assembly, manufactured part, disassembled kits, and sub-contracted assemblies.

Menu: Manufacturing/Bill of Materials or Product Screen: Click on Bill of Materials button

Pre-requisite: All the components required for the assembly or the by-products that would come out need to be defined before bill of materials is defined.

## Manufacturing/Printing

1. Pick the product (finished product / sub-assembly / printed part / kit or package).
2. Define a unique name - It is typical to set the product name
3. Define quantity - Typically 1. But there may be instances when multiple units can be produced.
4. Reference - Set a unique reference
5. Pick the routing what will help manufacture the product.
6. Define list of components
  - a) Click on add an item

## 6.2. CONFIGURATION

- b) Select product component / raw material
  - c) Set the quantity to be consumed
  - d) Set the unit of measure for the component/raw material consumption
  - e) Valid from and Valid until does not need to be set. Use this if a component is being replaced but you would like to keep it in the component list.
7. Define internal reference, valid from and valid until in the Properties tab if required.
  8. Do not use the By Products tab.

### Disassembly of Kits

1. Pick the product (A main product from the disassembly - e.g. Rambo board).
2. Define a unique name - It is typical to set the product name
3. Define quantity - Typically 1. But if the kit has multiple items of the product use that.
4. Reference - Set a unique reference
5. Pick the routing what will help manufacture the product.
6. Define list of components
  - a) Click on add an item
  - b) Select the kit (e.g Rambo Kit)
  - c) Set the quantity to be consumed to 1
  - d) Set the unit of measure for the component/raw material consumption
  - e) Valid from and Valid until does not need to be set.
7. Define internal reference, valid from and valid until in the Properties tab if required.
8. In the By products tab, pick all the other products that come out of the kit disassembly. Leave the Quantity Type to be "Variable."

## 6.3 Manufacturing Process

Manufacturing in OpenERP allows tracking of goods and materials consumed in the process of production or assembly of finished products. The scheduler in OpenERP generates manufacturing orders for products that have supply method as "Manufacture" for the order level set for the product if the procurement method is "Make to Stock" and when a sale order is confirmed for products that are "Make to Order." At Aleph Objects, all the products have been set as "Make to Stock." This necessitates manual creation of manufacturing orders based on production planning (not yet available on OpenERP directly).

### Creating Manufacturing Order

Guidelines for creating manufacturing orders:

1. Follow a quarterly or multi-month MO creation for printed parts, sub-assemblies, sub-contracted assemblies/parts. This allows for different planning approach for the final finished products such as printers.
2. Follow a monthly cycle for finished products such as printers.
3. The purchase delay, manufacturing delay fields defined with the product is important. The manufacturing dates will be computed based on these delay values.
4. In addition to the above, set the parameters in the company record (this may require admin/configuration access).
  - a) Scheduler range days: It is now set to 80 days. This means that the scheduler will schedule procurement/manufacturing for the next 80 days. Change this if required. This will be based on visibility required into the manufacturing window (month/quarter/half-year, etc.)
  - b) Purchase lead time: Additional lead time added to account for material receipt, inspection and use. This is the margin of error for supplier lead time. Default is 7 days.
  - c) Manufacturing lead time: Margin of error for manufacturing lead time. Default is 7 days.

### 6.3. MANUFACTURING PROCESS

- d) Security Days: Additional margin on the date promised to the customer. Default is 2 days.
- 5. Ensure all locations (for subcontracting and internal production lines) are set.
- 6. Ensure all required routings are defined.
- 7. Since the routing captures the location (internal or sub-contract), a single manufacturing process will cover internal and sub-contract manufacturing. Additional details for sub-contract manufacturing are provided at the end of this section.

## Processing Manufacturing Order

Process:

- 1. Creating an MO:
  - a) Create a new manufacturing order from Manufacturing/Manufacturing/Manufacturing Orders
  - b) Select the product to produce
  - c) Select routing
  - d) Set quantity of products to produce
  - e) Define the person responsible for completion of the manufacturing order.
  - f) Define source document (product planning reference if any)
  - g) Raw materials location and finished products location should be "Physical Locations / Aleph Objects, Inc. / AM" for internal locations. For subcontract production, the appropriate location must be shown. This is automatically populated based on the routing.
  - h) Set the priority in the "Extra Information" tab.
  - i) Save the order
- 2. Confirm production: This step brings up the products to consume list as per the Bill of Material defined for the product being produced.

3. At this point, the details of the production can be viewed from work orders tab; details of products consumed from "Scheduled Products" tab and the finished product from "Finished Products" tab.
4. If all the components are available for production, the manufacturing order will have "Produce, Mark as Started, Cancel Production" buttons. The manufacturing order will be in "Ready to Produce" state.
5. If components are not available, procurement exception will be generated for the components. This will automatically resolve if there are reorder levels defined for the parts not in stock. If not, the Purchase order will have to be generated manually and the procurement exception cleared. Once the parts/materials are available, the MO will automatically proceed to the "Ready to Produce" state.
6. In case of a sub-contract, stock moves for the material will be created for delivering the parts/raw materials to the subcontractor. In a similar manner, moves will be created for receiving finished parts/products from subcontractor.
7. Send the material to sub-contractor as per the delivery order created.
8. Mark as started: The floor supervisor marks the order as started for internal production and the production controller / manufacturing head set it for the sub-contract orders.
9. For simple, single-step orders, the "Produce" button can be clicked. This will execute the work order (see work order tab in MO form) automatically.
10. For multi-step process, there are two options available to the production floor supervisor: Mark the entire MO as produced when the order is completed or manually process each of the work order. The work order can be processed from the Manufacturing order form/Work order tab or picking them from the Manufacturing/Manufacturing/Work Orders menu.

## 6.4 Safety

Keep everything clean. :)

## 6.5 Pre-sub Assembly

Soldering, PEMS, etc.

## 6.6 Pilot Line

The pilot line is the line currently building TAZ.

## 6.7 Main Line

The main line is the line being set up in the big room.

See figure 6.1 for Aleph Object's main floor line layout.

## 6.8 Quality Control

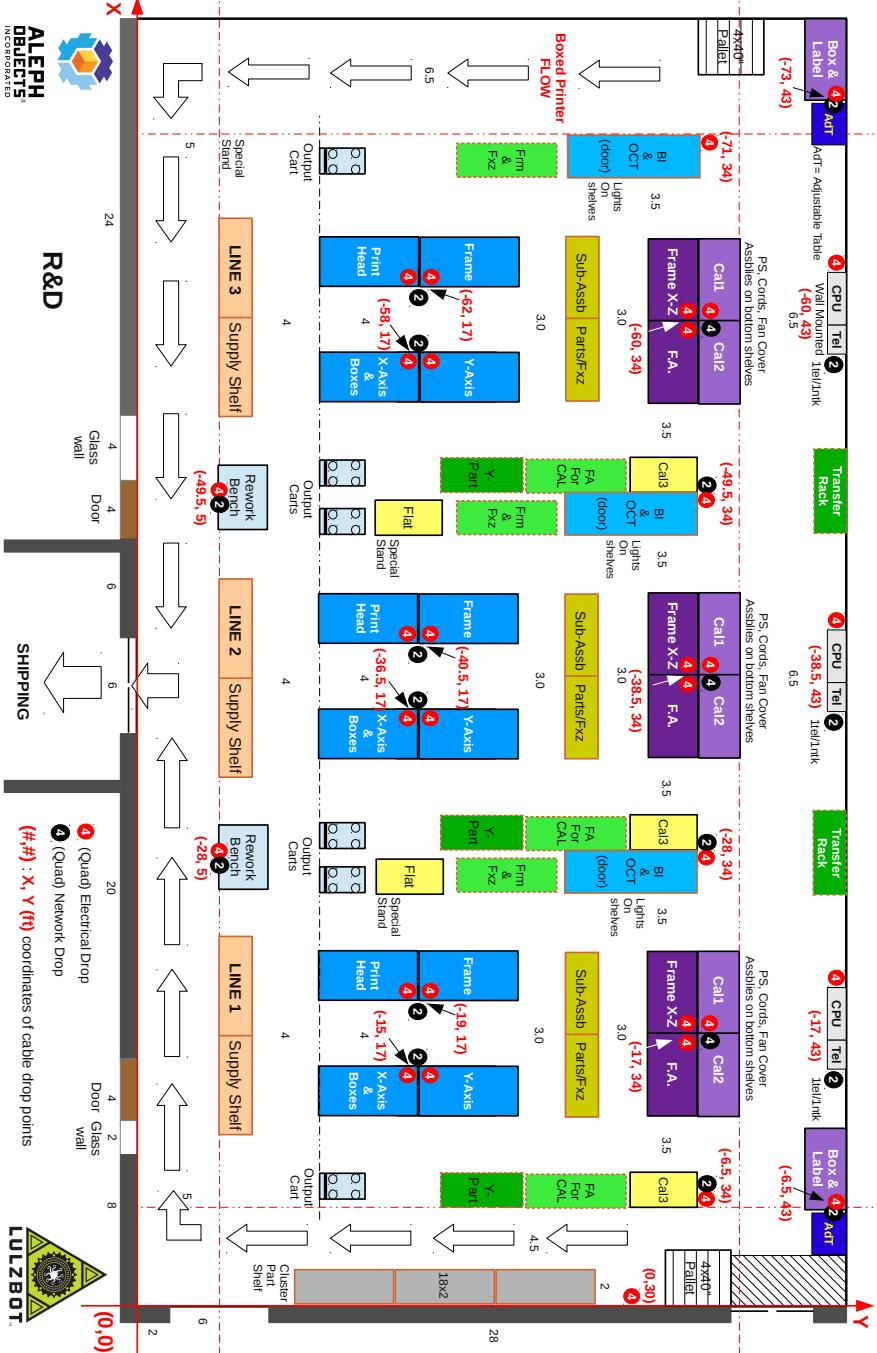
Link to docs here...

## 6.9 Packaging

Continually improve packaging. Lessen cost, very expensive at present.  
Send to FedEx for testing.

## 6.10 Lean

Get rid of everything unused.



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# **Marketing and Public Relations**

## **New and Deprecated Media**

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7.1 Trade Shows / Events

7.2 Web Ads

7.3 Social Media

7.4 Promotions

7.5 Traditional Deprecated Media

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**Products**

**Buy and Sell**

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## 8.1 New Product Introduction

### 8.2 Part Numbers

Internal Part Numbers

Manufacturer Part Numbers

Supplier Part Numbers

### 8.3 Serial numbers

### 8.4 Inventory

Locations

FIFO

Receiving

Delivery

Moves

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**Sales**

**Moar**

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## 9.1 Quotes

### Creating a new Quote

A quotation is a draft document that captures customer's interest in the company's products. In this state, the document may be changed any number of times and / or cancelled.

1. From Sales/Sales/Quotations, create a new quotation.
  - a) Alternately, the lead-opportunity process may have created a quotation already. In that scenario, open that quotation for the next step.
2. Select customer. If there are separate addresses for invoicing and delivery, choose them.
3. Provide customer reference (e.g. PO02533, phone reference, etc.).
4. For government or educational institutions, select “Govt/Educational Institutions (USD)” pricelist.
5. Define terms and conditions if any.
6. Select products for the Order lines tab. Define quantity, adjust unit price, set discount.
7. Switch to Other Information tab.
  - a) Set Incoterm. Default is EX WORKS for orders transferred from ecommerce site (Ubercart). Change to “Delivered At Place” for orders that will be invoiced for billing. Change to “Delivered Duty Paid” for orders processed through Fedex IPD.
  - b) Invoicing terms: Default is “On Delivery Order.” Change this to “On Demand” for international orders. This change will allow generation of Proforma Invoice before delivery.
  - c) Select payment term – relevant for non-web orders
  - d) Select Fiscal Position – Tax terms as applicable [This will probably change with Avalara module]
8. Save the quotation

## 9.2. ORDERS

9. Print the quotation if required.

### Confirming the Quote

This step confirms the customer's intent to buy. Confirmation generates a series of stock moves and other documents in OpenERP. The sale order (the quotation becomes a sale order on confirmation) cannot be cancelled without the associated delivery order and invoice (if any) cancelled. Changes are allowed only on the text fields – no quantity, price, customer, address, terms info may be changed after confirmation.

1. Identify the quotation from Sales/Sales/Quotations by searching on the customer name or by quotation number.
2. Verify the contents of the quotation and ensure its completeness (refer to Creating the Quote steps).
3. Press “Confirm Sale” button to confirm the quotation.
4. The sale order is created. From this time, this order will be seen under Sales/Sales/Sales Orders.
5. Print the sale order to send to customer / email the document directly – this step requires the customer's email in OpenERP. If not the user will be prompted to enter one.
6. If the order is international, press the create invoice button to create a draft invoice.

## 9.2 Orders

### Delivering the Order

Once the sale order is confirmed, a delivery order is created. This lets the warehouse person know what to ship and where. Additionally, the warehouse person may generate the customer invoice depending on the invoice creation mode.

## OpenERP Sales

1. The items pending delivery can be viewed from Warehouse/Receive/Deliver By Orders/Delivery Orders.
  - a) The status of the delivery orders will be one of Ready, Waiting, Back Orders, and To Invoice.
    - i. Ready: These are orders that can be fulfilled immediately.
    - ii. Waiting: These orders are waiting for one or more items in the order.
    - iii. Back Orders: These orders are partial delivery pending from a previous order. Note that the partial delivery is based on quantities not fulfilled when they could have been.
    - iv. To Invoice: These orders are waiting for the warehouse person to generate invoice. This state will be shown on orders that originated from sale orders that have invoice method as “On Delivery Order.”
  - b) Additional search conditions may be defined based on delivery order number of source document number – which in this case is the sale order number.
2. Select the delivery order.
3. Record additional information in the internal notes section – tracking number, shipper notes, etc.
4. If the delivery is international, the proforma invoice needs to be printed before the delivery order can be processed.
  - a) Go to the sale order associated with the delivery order. The invoice method on this sale order must be “On Demand.”
  - b) Generate the customer draft invoice if not generated already.
  - c) Open the invoice by clicking on the “View invoice.”
    - i. Click on Proforma to set the invoice in the proforma state
    - ii. Print the invoice and it will read “Proforma Invoice.”
  - d) Attach the proforma invoice to the delivery order and enclose a copy of it to the delivery package.
5. Click on deliver to complete the delivery order.

## 9.2. ORDERS

### Web Sales

1. The invoice method should be set to On Demand in the sale order associated with these sales.
2. The warehouse person reviews the delivery order and confirms the delivery of goods for the order from Shipwire.
3. If not all items have been shipped from Shipwire, the delivery order will be kept pending until all items in the order are delivered.
4. If Shipwire has fulfilled the order, the delivery order can be updated to reflect this information (tracking number, etc.) and marked delivered by clicking on “Deliver” button. The source location in the delivery order line must be set to the appropriate location (Shipwire location or AM location).

### Generating Customer Invoice

#### Web Sales

Web Sales: These are sales for which payments have been received through credit card on the shopping cart (Ubercart). Currently, these orders are being keyed in from Ubercart. Once the sale order is created in OpenERP (Invoice method = On Demand, Incoterms=EX Works), the invoice must be created and payment processed.

1. Confirm the sale order.
2. Create the draft invoice (Note: this method is used for all web sales and OpenERP sales that are international shipment)
3. Validate the invoice and get it ready for payment.

#### OpenERP Sales

OpenERP Sales: These are sales that are entered in OpenERP (phone sales, local sales, institutional sales, donations, etc.) The invoice method must be set to “On Delivery Order” and Incoterms must be set to “Delivered at Place” for non IPD shipments, and “Delivered Duty Paid” for IPD shipments. For sales that are paid through Credit Card or international shipments, set the invoice method to “On Demand.”

1. Confirm the sale order.
2. If payment has been received through Paypal/Credit card or for international shipments, create draft invoice.
3. For international shipments, set invoice state to Proforma and print it out.
4. For institutional and other orders that will be invoiced on delivery, follow delivery process to create the invoice.
5. Validate the invoice and get it ready for payment

Note: Setting the correct invoice method is essential for a smooth workflow in the system and among the team.

### 9.3 Accepting Customer Payments

Record the customer payment when received. If invoice is in draft state, validate the invoice before proceeding with this. Invoices may be paid in two different ways.

1. Click on Pay in the invoice. This allows payment to be recorded against the invoice.
  - a) Enter the payment amount and pick the correct journal to record.
  - b) Complete payment.
  - c) Note: The payment amount if not in full will result in the invoice not marked “Paid.”
  - d) The balance due from the customer will be tracked.
2. Use Customer Payments to record the payment. This method brings up all pending payments due from the customer for payment.
  - a) Select the customer.
  - b) All the payments due from and to customer are listed in the Credits/Debits section.
  - c) Record the paid amount.

#### 9.4. VALUE CHAIN

- d) This amount will automatically be reconciled against pending payments and if completely adjusted, “Full Reconcile” flag will be checked against the credit records. If payment is not sufficient to fully reconcile against the dues, it will be adjusted against the first / latest due.

#### Notes

1. Record conversations with the customer during the negotiation if any along with the sales order using “Log a Note” feature. If the information needs to reach the customer then the “Send Message” option should be used.
2. Once the sales order is confirmed the only changes allowed are to the text fields. The customer, pricing details, product details are frozen and cannot be changed. Please review all the options before confirming the SO.
3. Make sure to set the right payment term for the customer (Immediate payment for web sales and NET30 or as the case may be for other orders) as this will be used for aging analysis.

### 9.4 Value Chain

Everything we do must create value for the customer.

### 9.5 Customers

OpenERP —> Sales —> Sales —> Customers

### 9.6 Export Compliance

Comply with export.gov. Contact Denver office with any questions we can't resolve.

## 9.7 Phones

Transfer call

1. Ask the caller if you can transfer them.
2. Put the call on hold: \*2
3. Dial internal extension number you want to transfer to.
4. Explain transfer when internal callee answers.
5. Hang up, and the call will automatically transfer.

## 9.8 Incoming OpenERP Email

The email address `sales@alephobjects.com` and `sales@lulzbot.com` goes into the OpenERP Sales Leads.

OpenERP —> Sales —> Sales —> Leads

## 9.9 Products

OpenERP —> Sales —> Products —> Products

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## **Shipping**

## **Delivery and Receiving**

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## 10.1 Serial Numbers

### Updating Serial Numbers in Delivery Order

Serial numbers can be entered only in a draft Delivery Order.

1. For each line in the delivery order, click on the “Split in Serial Number” button on the line.
2. Click on Add an Item in the popup that opens and key in the serial number.

Enter serial number and quantity for each number. Typically, in Aleph Objects case, the quantity will be 1 for each serial number.

In the above example, the quantity is defined at 2. So, enter two serial numbers on two separate lines.

3. When serial number is entered, choose the “Create and Edit” option after keying in the serial number. This will bring up a popup as shown below.

Enter internal reference, prefix information if required. Do not enter revision number or stock moves in this popup. Save the serial number.

4. Repeat the process for each line in the delivery order with a product that requires serial number association.

## 10.2 Delivery

## 10.3 Inventory

OpenERP —> Warehouse

### Receiving

OpenERP —> Warehouse —> Receive/Deliver By Orders —> Incoming Shipments

## 10.4. EXPORT COMPLIANCE

Moves

OpenERP —> Warehouse —> Receive/Deliver By Orders —> Internal Moves

### 10.4 Export Compliance

If you are unsure, don't ship. If we don't have the answer internally, contact Denver office of export.gov.

### 10.5 Products

OpenERP —> Warehouse —> Products —> Products

### 10.6 Harmonized codes

Every Product we sell must have a harmonized code listed. We are using the USA's Schedule B.

### 10.7 Country of origin

We need to know the country of origin of every product we sell.

### 10.8 NAFTA

We can get most of our Products into Canada and Mexico duty free under the North American Free Trade Agreement. Our printers and most of our parts qualify.



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**Warehouse**

**First In, First Out**

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## 11.1 Products

Serial Numbers

## 11.2 Inventory

Receiving

Delivery

Moves

## 11.3 FIFO

## 11.4 Locations

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# **Accounting**

# **Finance**

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## 12.1 Chart of Accounts

## 12.2 Periodic Processes

### Monthly Processes

Monthly Bank Statement Reconciliation

Monthly Statements

Monthly Reports

### Quarterly Processes

Quarterly Statements

Quartlery Reports

Quarterly Budget

### Annual Processes

Yearly Bank Statement Reconciliation

Yearly Statements

Yearly Reports

Yearly Budget

## 12.3 Payables

OpenERP —> Accounting —> Suppliers —> Supplier Invoices

## 12.4 Receivables

OpenERP —> Accounting —> Customers —> Customer Invoices

OpenERP —> Accounting —> Customers —> Customer Payments

## 12.5 Taxes

Sales Tax Nexus

Colorado, USA

Colorado Secretary of State

Loveland, Colorado, USA City of Loveland

Larimer County, Colorado, USA Larimer County

Longmont, Colorado, USA City of Longmont

Pennsylvania, USA

Pennsylvania

Illinois, USA

Illinois, and maybe Chicago

UK, EU

We are registered as a UK business so we can collect VAT.

Canada Federal

We are registered with a Canadian Business Number, so we can collect and pay sales tax.

Canada Provinces

Canadian Provinces...

Payroll

We are doing payroll through two companies at present.

Insperity

Insperity is a Professional Employment Organization (PEO).

Kelly

Kelly is temp-to-hire and recruitment.

## 12.6 GAAP

Generally Accepted Accounting Principles

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# **Research and Development**

## **Libre Innovation**

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## Research and Development

The license must be FSF approved or GTFO.

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## Contact

### Phone, Email, Web, Location

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## 14.1 Support

Email: [support@alephobjects.com](mailto:support@alephobjects.com)

Phone: +1-970-377-1111 x610

## 14.2 Sales

Email: [sales@alephobjects.com](mailto:sales@alephobjects.com)

Phone: +1-970-377-1111 x600

## 14.3 Website

Aleph Objects, Inc.

[www.alephobjects.com](http://www.alephobjects.com)



# Colophon

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Created with 100% Free Software

GNU/Linux

LATEX Memoir

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