RECOMMENDED EMAIL SYSTEMS IMPROVEMENTS

By

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Your Mission is Our Mission

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A. EXECUTIVE SUMMARY

A.1. Introduction

This report addresses issues surrounding email services used by individuals and small businesses. Email systems setup in the past few years may be obsolete, hard to manage, and currently inadequate. These email systems should be reviewed and revised for several reasons:

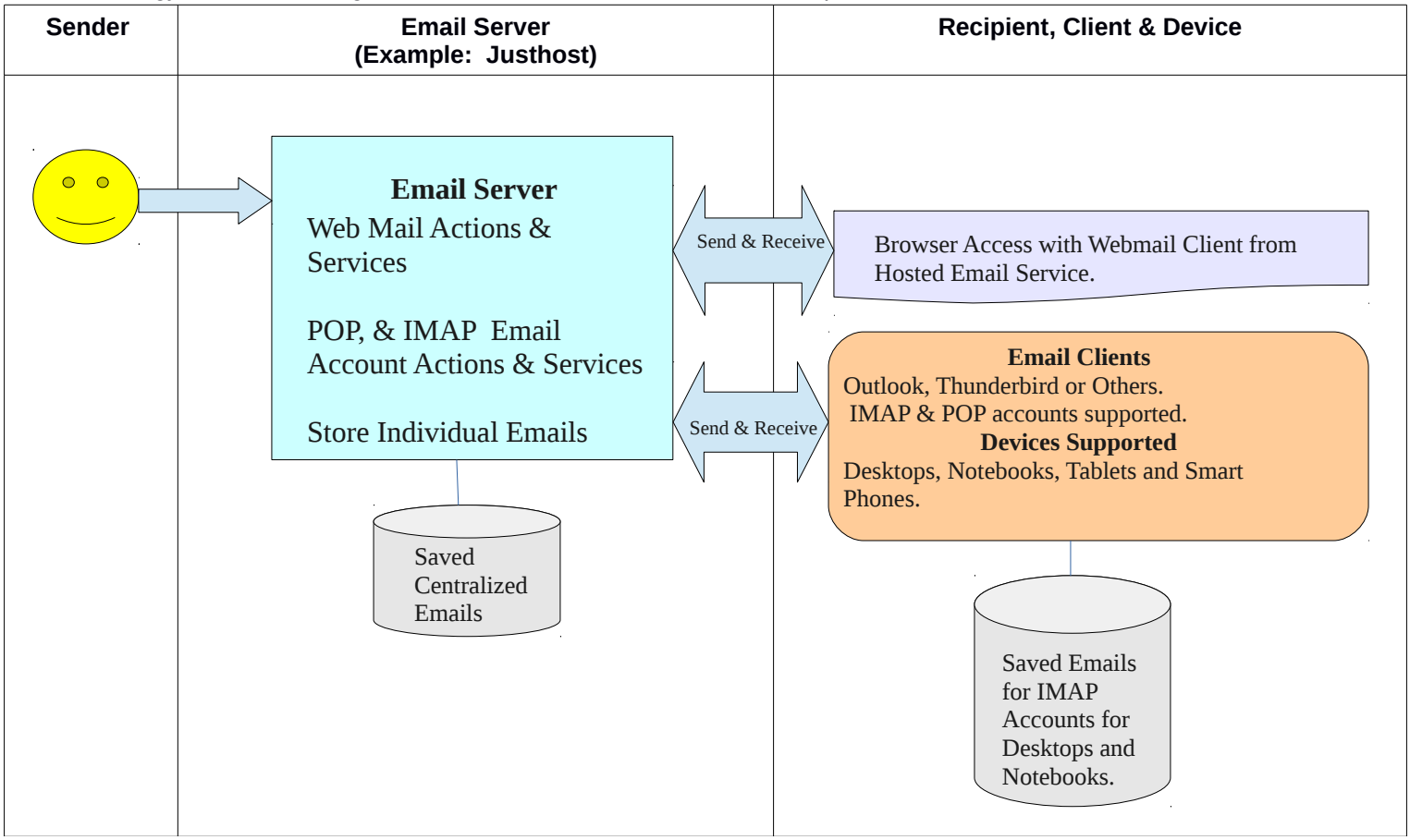
- They were setup on free email services (hotmail, gmail and yahoo for example).
- They were setup as POP email accounts which are simpler to manage, but lack many useful functions required today.
- IMAP accounts (explained below) should be setup to provide the many beneficial up-to-date and useful functions which are supported and synchronized amoung desktop PC's, notebooks, tablets, and smart phones.
- A recent development among the free email services which have been trying to reduce SPAM is that some emails that are automatically forwarded from a hosted email address may not be delivered reliably.

A review and upgrade of existing email systems will result in many benefits.

The purpose of this paper is to recommend an email system plan which will best serve the needs of small businesses and individuals. Two other topics, Spam Control and Security, are too broad to be included in this report, but may be the subject of future reports.

A.2. An Overview of How Email Works

This is a general overview of how email is received, stored, accessed and managed. Later sections of this report explain how these basic functions vary depending on the type of email account setup, the email client, and the device. The abbreviations and terminology used in this diagram are defined in a later section of this report.



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A.3. The Need to Improve Email Systems

There are three major reasons to review and improve your email systems.

1. The Proliferation of Mobile Devices.
2. The Need for Better Control, Management and Maintenance of Email, particularly business email.
3. The increasing problem of email delivery failures when email is sent to an email address and automatically forwarded to a Free Email Service, such as hotmail, gmail, and yahoo.

A.4. Email System Diagrams

The first 2 diagrams below reflect typical systems that have evolved over the past few years. The third diagram below is the recommended improved system.

1. Direct Email Through A Free Email Service (such as: hotmail, gmail or yahoo)
2. Email Automatically forwarded through a hosted email server, usually the same as the website server, to a Free Email Service.
3. Email Centralized on a hosted email server, with or without dependence on a Free Email Service.

A.5. Benefits of Improved Centralized Email Systems

1. All email accounts are setup as IMAP accounts for consistency among users and for most efficient access and management of emails retained.
2. Email is received, sent and stored on the websites' email server. This allows management, maintenance and backup of all email accounts setup on the email server.
3. Automatic forwarding is eliminated from the email server to a Free Email Service, for better reliability.
4. Email is locally and remotely accessible and manipulated by any email client, browser based webmail client and any supported device.
5. Emails are stored individually on the email server so that they can be more easily copied, backed up, moved to another server and archived without the restrictions which would result from the combined and compressed email storage files now supported on individual clients and Free Email Servers.
6. Some email clients provide settings for the retention periods for active emails and deleted emails.

A.6. Recommendations

1. Eliminate automatic email forwarding.
2. Configure all email clients with IMAP configurations.
3. Develop and implement email management, maintenance, and backup procedures.

A.7. Topics of this Report

1. Email System Components and Terminology.
2. Types of Email, POP3 and IMAP
3. How Email Works
4. Typical Email System Diagrams
5. Recommended System Diagram

B. Email System Components and Terminology

The following email component and terminology descriptions relate to their use in this report. If you are familiar with email terminology, you may want to skip to Sections E and F which diagram the 2 typical email systems and the recommended system. You can use the next several sections as reference if necessary.

B.1. Email System Components

B.1.1. Email Servers

Email servers perform several basic functions, such as:

- Receive email from senders.

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- Allow access and download to email clients and readers.
- Save email for a specified retention period or permanently.
- Perform functions and actions specified by the email client or reader as it accesses the email.

Email Server references in this report are to explain the functions performed. Servers are computers which perform the functions of an email server. These computers may be part of a local area network, part of a website and email hosting service, part of a free email hosting service or part of a cloud service. Hosted, free services and cloud servers are all remotely accessed servers. Therefore, in this report, all of these types of servers are considered functionally the same.

B.1.2. Free Email Services and Servers, FES

These services are widely used and freely available. They include such services as provided by:

- hotmail and/or Outlook
- yahoo
- gmail
- aol
- comcast

Email is read by logging into an FES account either through a browser or by setting up access to the FES through an email client on one or more devices. Emails are stored on the FES server and are retained, and may be backed up, according to the account settings. Email client access may be configured as POP or IMAP (defined later), with IMAP providing the most features.

Emails stored by FESs normally are not directly accessable to the user and may be stored in proprietary formats.

B.1.3. Hosted Email Services and Servers, HES

Hosted email services, as used in this report, refer to website hosting services which also provide email server hosting functions. There are many of these services available. Some widely used HESs include:

- Justhost
- Bluehost
- Hostgator
- GoDaddy

Email is read normally by two methods:

1. By logging into the email account through a browser to the HES's webmail application.
2. By setting up access to the HES through an email client on one or more devices. Both POP and IMAP accounts normally are supported, but the IMAP configuration is the more flexible and powerful.

Email stored with HES servers is much more accessible to systems administrators for maintenance, management, and backup. Emails are stored in individual files on the HES server and can by managed and backed up through direct access to the server without the use of an email client. This allows multiple email clients with different local email storage formats to access the same email account.

B.1.4. Email Clients and Readers

Email clients, sometimes called readers, are used to access email on an FES or HES server. Clients may have settings which control the retention period of emails on the server after they are read. The way email is managed and stored on the server is determined by whether the email account is configured as a POP or IMAP account. Email clients may save data on the device running the client. Emails saved by the client on the server are normally in a compressed format which is different from the server formats and which are not as easily managed outside of the client's application functions. Examples of email clients are:

- Outlook
- Thunderbird

B.1.5. Browser -- Webmail

Email may be accessed through a browser to an FES, as described earlier, or through a Webmail client available from the HES. Webmail provides access to email on the HES server and provides most, if not all, of the functionality of an installed email client on a device.

The Horde webmail client provides a wide range of email management functions, acts as an IMAP client and provides task, calendar and searching functions.

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B.1.6. Devices

Devices refer to the hardware used to access email through a browser or client application. Use of this term is meat to include the following:

- Desktop PC's running Windows, MAC OS X, or Linux Operating Systems.
- Notebooks running Windows, MAC OS X, or Linux Operating Systems.
- Tablets running Android, Windows, IOS or Chrome Operating Systems.
- Smart Phones running Android, Windows, or IOS Operating Systems

Many of these devices can support multiple browsers and multiple email clients.

Email is usually stored locally by the email client on Desktop and Notebook computers. The stored email file formats are not easily accessed and managed outside of the functions provided by the email client.

Tablets and Smart phones normally should not be used to store email data because of their limited capacity and lack of security Configuring the email accounts as IMAP on these devices allows for data management, maintenance and backup to be done on the HES server.

B.1.7. Local Email Storage

Local email storage refers to any disk file storing emails on any device running an email client. If multiple devices and clients are used to access the same account, the local email storage on each device may not be synchronized with the other devices and may not be complete.

B.1.8. HES Email Storage

HES Email storage is the centralized storage of individual email files. IMAP configuration of all email clients used to access email causes the HES server to be a single repository of all the retained emails for a specific IMAP account. This can be managed separately from the local email storage on various devices. It also assures that when a client accesses an IMAP email account the data is current, complete and the single source of email access for an account.

B.2. Terminology

B.2.1. Sender

The sender is the originator of emails addressed to an email account. A properly addressed email is received by an FES or HES server.

B.2.2. User

The user is the person accessing the Sender's email. Options for reading the email are described above for browser access to FES email, browser access to HES email or client access to HES or FES email servers.

B.2.3. Systems Administrator

The systems administrator is the individual with permissions to access HES email servers directly (outside of a client or webmail program) in order to perform important tasks including:

- Management of individual emails, such as archiving old email.
- Maintenance of emails which are marked for deletion.
- Backup of emails on the HES server with downloading to another device. This provides offsite backups and protection through redundancy.
- Monitor disk usage vs. limits
- Monitor number of email files stored vs. limit
- Backup Emails on Clients -- Thunderbird and Outlook and MAC Clients, Tablets and Smart phones.

B.2.4. Automatic Forwarding

Automatic forwarding causes an email received by an FES or HES server to be sent automatically to another FES or HES server. For example, it causes an email sent to pal@paldb.com, an HES server, to be automatically sent to pal@hotmail.com. This requires no intervention by a user.

It is possible, and it happens occasionally, automatically forwarded email through an HES server, may be rejected as spam by the receiving server. In this case, the sender receives no notice of the rejected email.

The email received by the forwarding server may be saved on that server, which is the case for Justhost. Forwarded email

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through hotmail may be deleted or saved after forwarding depending on a setting set when the forwarding is seltup.

B.2.5. Manual Forwarding

Manual forwarding refers to the situation where a user reads an email and selects the Forward option of the client to send the email to another email address. Normally, the forwarded email remains on the client device locally, in the Sent box on the client device, and on the HES and FES for IMAP accounts.

B.2.6. Folder/box

Folders and boxes, such as the Inbox, organize the email on both the local device and on the FES or HES server.

Folders are organized on both the email server and client device depending on the account type.

- POP account folders are organized under the email account so that Inbox, Sent, and others are all primary folders.
- IMAP account folders are organized under the Inbox, so that each box is a sub-folder under the Inbox folder.

B.2.7. Email Actions

Email actions can be taken by a user when accessing email through webmail on an email client. While the supported actions may vary with the webmail capabilities and the email client functions, some of the common actions are:

- Send
- Receive
- Reply
- Forward
- Delete
- Spam
- Create Mail Box
- Delete Mail Box
- Move or copy email between boxes
- Search for emails

C. POP3 vs. IMAP Email Account Types

Email clients must be configured to access a specific email account on an FES or HES server. The configuration requires specification of the email account type as either POP3 (Post Office Protocol, version 3) or IMAP (Internet Mail Access Protocol). There are several other types of accounts, primarily supported by Microsoft, which are usually used for large organizations and which function very much like IMAP, so they are not discussed further in this report.

Email is received by an FES or HES server and saved as individual files. What happens to each email file on the server is determined by the email type that is setup on the client and the actions requested by the client.. Regardless of the email account type, email clients save the the emails locally on the device. The saved email is normally combined with other emails, and possibly in a compressed format. Locally, the email client manages the saved email and performs various actions on it.

The email type determines what the email client does with the email stored on the HES server.

- Clients for POP3 accounts perform a very limited set of functions on the server.
- Clients for IMAP accounts perform many functions and actions on the server which are triggered by various email actions taken by the client.

C.1. POP3 Server Actions

Clients for POP3 accounts only read email, store email for a limited time, and delete email. Any other action taken by the client on the local device does not affect the email retained on the server. In general, email for POP3 accounts is not retained by the server for very long periods.

There are only two major actions taken on the server by the POP3 email client:

- Emails that are read by the client are marked as read.
- Read emails are deleted if they have remained on the server past the retention period. The retention period is specified when configuring the POP3 account and is normally specified in days. If the retention is 0 days, then the email is

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deleted on the server after it has been read.

Read emails that fall within the retention period may be read by other devices and their client. However, if the other client was setup with a shorter retention period, the email will be deleted on the server according to the shorter retention period..

These server actions do not affect the email stored on client devices.

C.2. IMAP Server Actions

Clients for IMAP accounts perform many actions which are implemented both on the local device and on the FES or HES server. Therefore, a change in the email folder organization on the local client is also made on the server so that if another client accesses the email, it sees the updated changes on the server and those changes are automatically made on the local client device.

Some clients such as webmail, smartphones and tablets which do not store data on the local device, will make the changes on the server. These changes are then updated to each subsequent email client that accesses the email account.

Individual emails saved on the server are only deleted when they are deleted by a client accessing the email. There is a retention period for active and deleted emails that may be specified on the client's settings. IMAP email can be saved permanently as well.

IMAP accounts are most appropriate for the following conditions:

- A variety of email clients and devices are used to access a single account. For example, accessing email in the office, at remote business locations and at home is synchronized so that all clients display the same emails.
- Several users must access the same email account with one or more clients or devices.
- Centralized email backup, management and maintenance is required rather that individual backups of each email client's device storage.
- An environment of high employee turnover exists and email continuity is required for specific employee positions.
- An environment of several part-time employees who require email sharing and continuity.
- Business email is required to be available to the business management at all times and not spread around multiple email clients and devices.
- System administration activities require independence from the variety of stored email formats that exist on local client devices.
- IMAP accounts may require more systems administration than POP3 email setups, but the benefits are worth the extra efforts.

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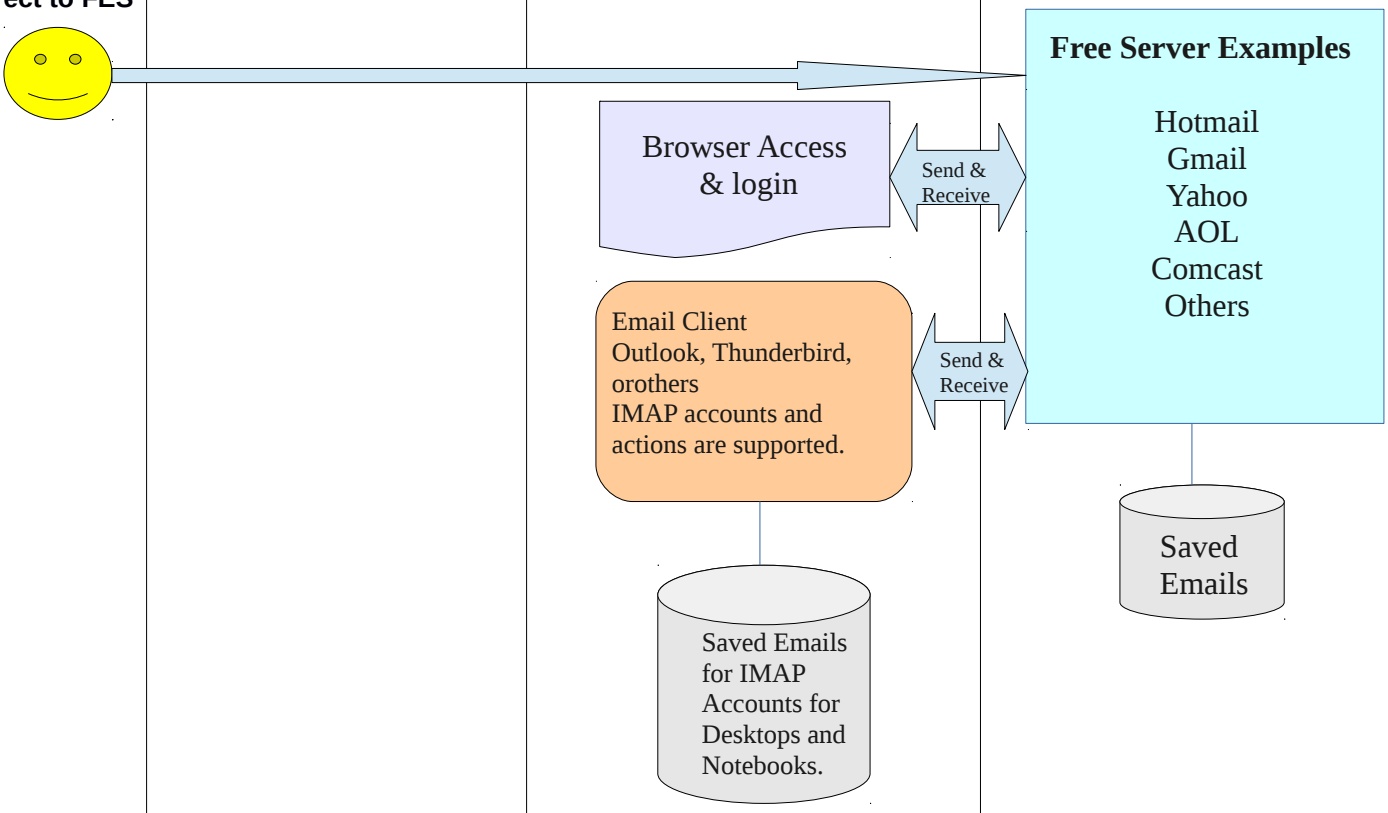
D. Two Typical Email System Configurations

D.1. Direct Email to Free Email Service.

Example email destination email address: pal@hotmail.com

Sender & Email Model	Hosted Email Server	Recipient & Client Device	Free Email Server (FES)
Direct to FES			
NOTES:		Deleted emails by the IMAP client automatically delete on the FES. Saved email retentions is determined by the Client settings and possibly by the FES settings.	Deleted Email does automatically delete on the IMAP Client. Saved email retention is determined by the settings and policies of the FES

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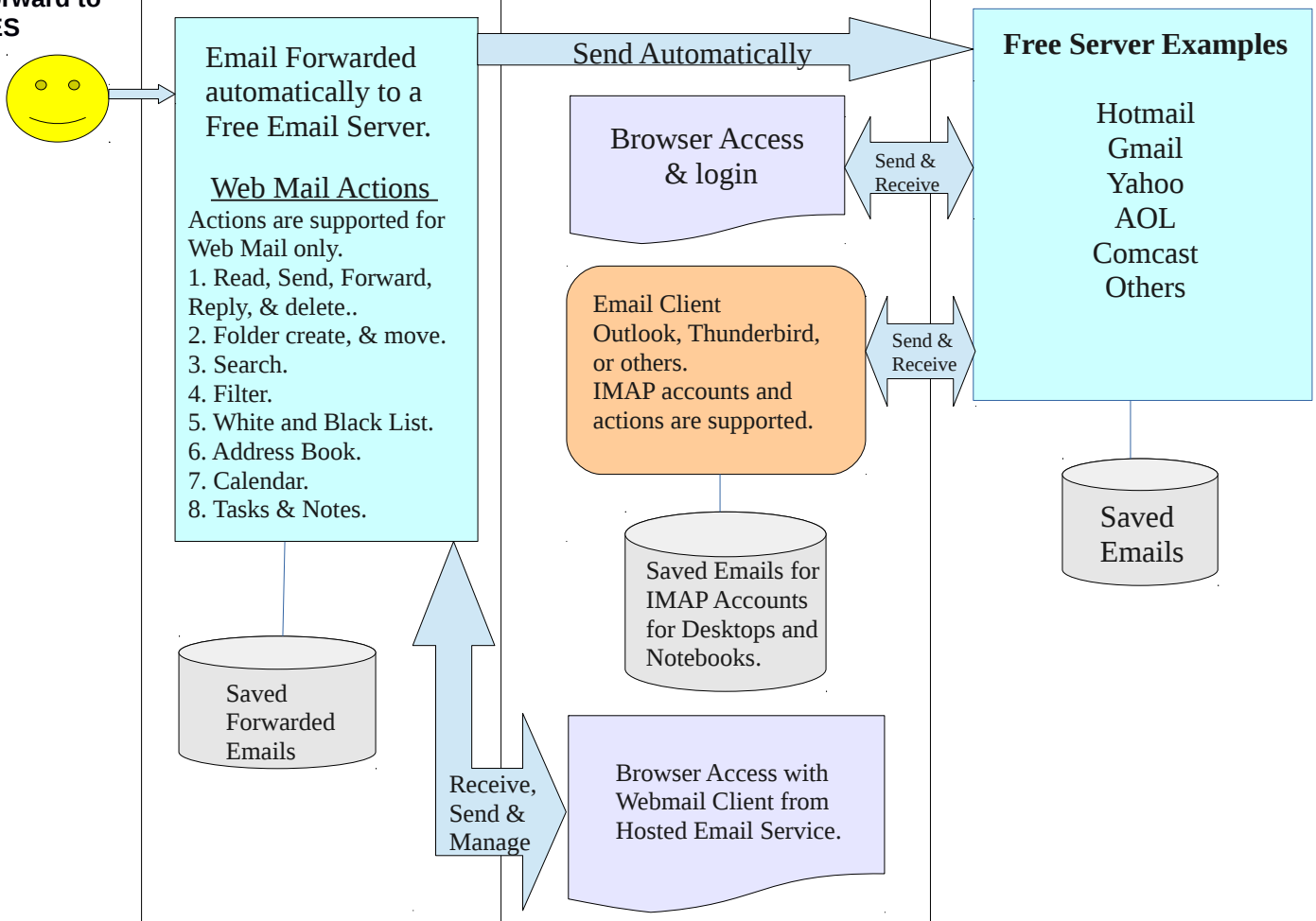
D.2. Forwarded Email from a Hosted Email Server to a Free Email Service.

Example destination email address: test@paldb.com

Sender & Email Model	Hosted Email Server (Justhost)	Recipient & Client Device	Free Email Server (FES)
Forward to FES			
NOTES:	1. Emails are saved, but not deleted autotmatically by either email clients or the Free Email Server. Therefore, these emails must be backed up and deleted periodically to avoid exceeding allowable file count limits set by the Hosting Service. 2. Any action taken with these saved emails does not affect the emails saved either on the client device or the Free Email Service.	1. Deleted emails by the IMAP client automatically delete on the FES. 2. Saved email retention is determined by the Client settings and possibly by the FES settings.	1. Deleted Email automatically deletes on the IMAP Client. 2. Saved email retention is determined by the settings and policies of the FES

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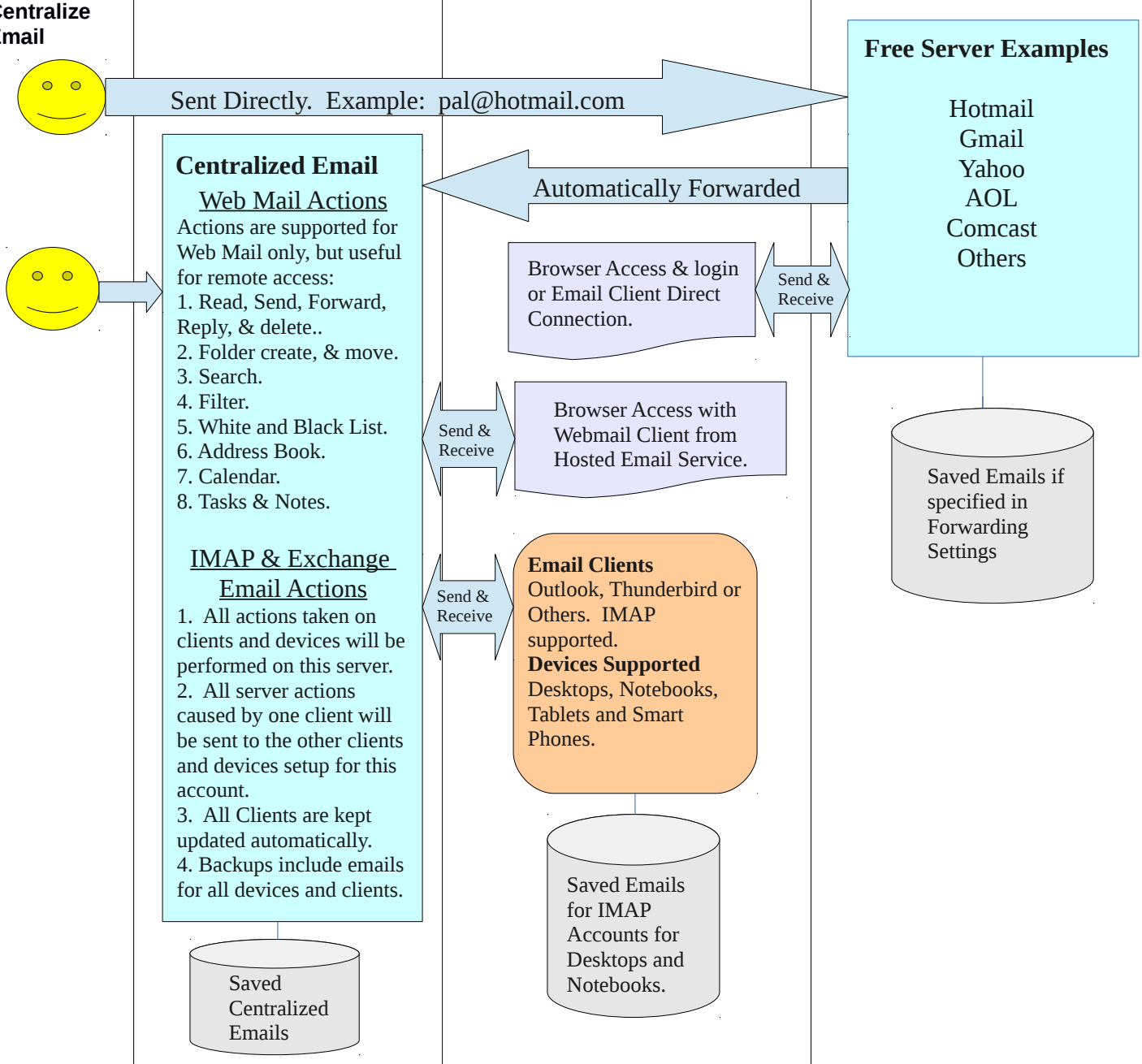
E. Recommended Centralized Email System

Sender & Email Model	Hosted Email Server (Example: Justhost)	Recipient & Client Device	Free Email Server (FES)
Centralize Email			
NOTES:	All thes centralized functions are simply achieved by: 1. Setting up the email account on the Server. 2. Setting up an IMAP account on each client and/or device..	Deleted emails by the IMAP client automatically delete on the FES. Saved email retention is determined by the Client settings and possibly by the FES settings.	Deleted Email does automatically delete on the IMAP Client set up directly to the FES. Saved email retention is determined by the settings for forwarded email of the FES Settings may include deleting or saving email.



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F. APPENDIX

F.1. Links to Email Forwarding Problem Explanations

https://my.justhost.com/cgi/help/446

https://my.justhost.com/cgi/help/516

http://www.craigslist.org/about/help/where_email

F.2. Links to Email Articles

http://www.howtogeek.com/99423/email-whats-the-difference-in-pop3-imap-and-exchange/