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3270BBS Administrator's Guide: Administrators and Moderators

3270BBS Version 4.3

m o s h i x

Edition Notice

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This edition applies to Version 4.3 of 3270BBS and to all subsequent versions and modifications until otherwise indicated in new editions. Changes are made periodically to the information herein; before using this publication in connection with the operation of a bulletin board system, consult the release notices distributed with the program.

Information in this publication is subject to change. Any such change will be reported in a new edition or in a technical newsletter posted in the **3270BBS** conference of the system to which this publication applies.

Screens reproduced in this publication were captured from a running 3270BBS system that held fictitious users and content only. The names of persons, conferences, and topics shown in the figures are invented, and the network addresses shown are reserved for documentation. The exact contents of the screens at a given installation depend on the options set in the configuration file, on the access level of the user, and on the activity of the community.

Comments on this publication may be posted as a topic in the **3270BBS** conference, or raised at `https://github.com/moshix/3270bbs`.

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3270BBS is the successor to Forum3270. Other product and company names mentioned herein, including IBM, MVS, z/OS, ISPF, SDSF, JES2 and TSO, are used for descriptive purposes only.

Preface

About This Publication

This publication is a guide for the *administrators* and the *moderators* of a 3270BBS system. It describes how the system is configured, every function that is reserved for administrators and for moderators, and the machine resources that a system of a given size requires. The functions that are available to every user are described in the *3270BBS Terminal User's Guide*, and are repeated here only where an administrator or a moderator sees them differently.

Who Should Read This Publication

- The **system operator**, who installs 3270BBS, maintains its configuration file, and starts and stops the program, should read the chapters on the configuration file and on performance and sizing.
- An **administrator**, a user whose account carries the administrator attribute, should read the chapters on the administrator functions. On most systems the system operator is also the first administrator.
- A **moderator**, a user whose account carries the moderator attribute, need read only Chapter 9, Moderator Functions.

Familiarity with the *3270BBS Terminal User's Guide* is assumed. Much of the material will also be familiar to users of TSO, ISPF, SDSF, and JES2.

How This Publication Is Organized

- **Chapters 1 and 2** describe the configuration file, `tsu.cnf`: first the settings that an installation must supply, and then the optional settings, grouped by the function that each one controls or enables.
- **Chapters 3 through 8** describe the functions reserved for administrators: the administrator's menu and commands, the management of users and of content, system activity and the control of services, database maintenance, and the operator console.
- **Chapter 9** describes the functions available to moderators.
- **Chapter 10** describes the resources that 3270BBS consumes, the measurements on which its sizing is based, and the recommended machine configurations for small, medium, and large systems.

Conventions Used in This Publication

- Keys are shown as **`F3`**, **`ENTER`**, **`PA1`**, and **`CLEAR`**. On most 3270 emulators, the keys **`F13`** through **`F24`** are produced by holding **`Shift`** while pressing **`F1`** through **`F12`**.
- Data that the user types, the names of configuration keys, and file names are shown in `THIS TYPEFACE`. Text that the system displays is shown in the same typeface when it is quoted in a sentence.
- Screens captured from a running system are shown as numbered figures. Each caption indicates whether the screen was taken on a Model 2 (24 x 80), a Model 3 (32 x 80), or a Model 4 (43 x 80) display station, and names the file in which the capture is kept.
- Values shown in the configuration examples in place of passwords and keys, such as `<password>`, must be replaced by the real values of the installation. Real secrets are never shown.

Related Publications

- *3270BBS Terminal User's Guide: Users and Moderators*, GC27-3270: the companion to this publication, which describes every function available to a user at a display station (`How_To_Use_3270BBS.pdf`).
- The program itself, its installation scripts, and the remainder of its documentation, at `https://github.com/moshix/3270bbs`.

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Chapter 1

The Configuration File: Mandatory Settings

This chapter describes the configuration file of 3270BBS, `tsu.cnf`: where it is kept, how it is written, when it is read, and how it is created for the first time by the setup wizard. It then describes the settings without which 3270BBS cannot be installed or cannot perform a function that the file itself has requested. All other settings are described in Chapter 2.

The File tsu.cnf

The configuration file is named `tsu.cnf`. The name is fixed and cannot be changed by an option. 3270BBS opens the file in its *current working directory*, and it expects the database file `tsu.db`, the SSH host key `ssh_host_key.pem` and the other files it uses in the same directory. The program must therefore always be started from the directory that holds these files.

The file contains passwords and API keys in clear text. The setup wizard creates it with permissions 0644, readable by every user of the host. The administrator should restrict it to the account that runs 3270BBS, for example with `chmod 600 tsu.cnf`.

Syntax

The file is a sequence of lines of the form `key=value`. The rules in the following table apply to every key.

Item	Rule
`key=value`	One setting per line. Blanks around the key and around the value are removed. A line that contains no equal sign is ignored.
`Key names`	Not case-sensitive: `START_SSHD`, `start_sshd` and `Start_SSHD` are the same key.
`# comment`	A line whose first non-blank character is `#` is a comment. Within a value, `#` starts a comment only at the beginning of the value or after a blank or tab: `pass#word` keeps its `#`, while `yes # note` is read as `yes`.
`"quoted"`	A value that begins with a double quote is taken exactly as written up to the next double quote; anything after the closing quote is discarded. There is no escape for the double quote itself. A value with no closing quote is used as written, quote included.
`yes/no values`	`yes`, `true`, `1`, `on` and `no`, `false`, `0`, `off`, in any case.
`Numbers, ports`	Decimal integers. A port must be in the range 1 to 65535.
`Repeated key`	The last occurrence is used, except for `required_conferences`, whose lists are added together, the `remote`*n* entries, each of which defines a separate host, and `show_logon_stats`, whose first occurrence is used; an unusable value of that key means `no`, without a warning.
`Unknown key`	Ignored without any message. A misspelt key name therefore has no effect and is not reported.

Figure 1-1. Syntax rules of tsu.cnf

Values that cannot be used

An unusable value never stops 3270BBS. The built-in default for that key is kept, and a warning is written to the operator console and to the BBS log (the `LOG` command of SDSF). Each distinct warning is written once for the life of the process, and is shortened to 62 characters so that it fits on one line of the LOG screen. The warnings are:

Warning	Cause
`tsu.cnf: bad yes/no for key: value`	A yes/no key has a value not listed in Figure 1-1.
`tsu.cnf: bad number for key: value`	A numeric key is not a number, or is negative where that is not allowed.
`tsu.cnf: bad port 1–65535 for key: value`	A port number is out of range.
`tsu.cnf: bad db type, using sqlite3: value`	The `db` key names an unknown engine. Displayed in red, because every PostgreSQL setting is then ignored.
`tsu.cnf: bbs_name >10 chars, using: name`	The BBS name is longer than 10 characters and has been cut.
`Cannot verify new users: no SendGrid key in tsu.cnf`	`verify_newuser_email=yes` without a SendGrid key. Displayed in red; registration then proceeds without verification.

Figure 1-2. Configuration warnings

When the File Is Read

3270BBS reads the file during startup, after the time-synchronization check and before it opens the database or binds any listener. If `tsu.cnf` (or `tsu.db`) does not exist, the setup wizard is run first (see The Setup Wizard). If the file exists but cannot be opened or read, 3270BBS displays `Please fix the configuration error in tsu.cnf before starting the application.` and ends. This is the only configuration condition that prevents startup.

The values read at startup are kept in storage, and almost every function uses that copy. **A change to the file therefore takes effect only when 3270BBS is restarted.** The exceptions, which are read from the file again each time they are used, are listed in the following table.

Key	Read again
`show_logon_stats`	Each time the logon screen is displayed, and when **F2** is pressed on it.
`remote`*n*`, remote`*n*`_*`	Each time the Doors list (extended menu option 4) is displayed.
`required_conferences`	Each time a user tries to unsubscribe from a conference.
`ftp_port, ftp_limit`	When FTPD is started with `S FTPD` (after `P FTPD`; a running server is left as it is).
`fingerd_port`	When FINGERD is started with `S FINGERD`.
`smtp_port, smtp_domain, smtp_drop_dimarc`	When SMTPD is started with `S SMTPD`, which a running server refuses with `SMTP server already running - P SMTPD first`.
`httpd_port, https_port, tlscert, tlskey`	When HTTPD is started again with `S HTTPD`.
`tlsport, tlscert, tlskey`	When the TLS listener is started with `S TN3270TS`.
`bbs_name`	For each web page, FTP greeting, and system finger reply. The 3270 screens, SSH, and mail keep the value read at startup.

Figure 1-3. Settings that take effect without a restart

If the re-read for `S FTPD`, `S FINGERD`, or `S SMTPD` fails, the values read at startup are used and the warning `tsu.cnf reread failed - keeping last good config` is written. For the other keys in the table a failed re-read falls back, without a message, to the startup values (`required_conferences`) or to the built-in defaults. Starting a service from SDSF does not change the `start_` keys in the file; the next restart again starts exactly the services that the file names.

The Setup Wizard

When 3270BBS starts and finds that `tsu.cnf` or `tsu.db` is missing from the current directory, it runs an interactive setup wizard on the operator's terminal before anything else is started. The wizard needs a real terminal. If the terminal cannot be put into raw mode (for example, when output is redirected), 3270BBS displays `Please create tsu.cnf and tsu.db manually.` and ends.

If `tsu.cnf` is missing, the wizard presents its settings on seven pages: GENERAL SETTINGS, DATABASE, NETWORK PORTS, SERVICES, TLS CERTIFICATES, EMAIL & NOTIFICATIONS, and APIs & ADVANCED. A help text describes the field under the cursor. The following keys are valid in the wizard:

Key	Function
`TAB, Down, ENTER`	Next field; from the last field of a page, the first field of the next page.
`Shift-TAB, Up`	Previous field.
`PgDn, F8 / PgUp, F7`	Next page / previous page.
`Space`	On a yes/no field, switches the value. Elsewhere, types a blank.
`Ctrl+F`	On the certificate and key fields, opens a file browser.
`F10`	Checks every field and, if all are valid, writes `tsu.cnf`.
`Ctrl-C`	Ends the wizard without writing anything (`Setup aborted.`).

Figure 1-4. Keys of the setup wizard

`F10` refuses to write the file while any field is invalid, and shows the reason on the status line:

Message	Field

`BBS Name is required`
`BBS Name must be 10 characters or fewer`
`BBS Name must not contain spaces`
	bbs_name

`DNS Name is required`	dns_name
`field` `must be a number between 1 and 65535`	Every port field, including db_port. An empty port field is allowed.
`field` `must be a non-negative number`	max_emails_per_day, new_users_sendban
`field` `must be 1 or more`	ftp_limit
`Database Engine must be sqlite3 or pg`	db
`Required Conferences must not contain '#'`	required_conferences
`Not a CIDR or IP address:` *`entry`*	web3270_trusted_proxies
`field` `must not contain a double quote`	Every text field

Figure 1-5. Validation messages of the setup wizard

While the SendGrid API key field is empty, the fields `verify_newuser_email`, `notify_admin_new_accounts` and `max_emails_per_day` cannot be changed, and the two yes/no fields are written as `no`.

The file that the wizard writes begins with a summary of the syntax rules, lists every wizard field under its page title, and writes an empty field as a comment line (`# key=`). Values that contain a blank, a tab or `#` are written in double quotes, as are `MOTD` and `SENDGRID_API_KEY`, which are also kept in upper case: the maintenance script `solicit_old_users.bash` searches for them with a case-sensitive match. After the wizard pages the file contains commented templates for global chat and newsgroups and one active Doors entry, `remote1=MVS3.8`, which connects to `www.moshix.tech` port 2300.

If `tsu.db` is missing, the wizard then displays the database creation screen. **`F10`** creates the SQLite3 file `tsu.db` with the default accounts. **`Ctrl-C`** ends the wizard without creating `tsu.db`. If the wizard wrote `tsu.cnf` in the same run, the file is deleted, so that the next start begins the wizard again, and the message is `Setup aborted. No files were created (tsu.cnf was removed).` If `tsu.cnf` existed before the wizard started and only `tsu.db` was missing, the file is left as it was, and the message is `Setup aborted. tsu.cnf was left unchanged; tsu.db was not created.` The file `tsu.db` is required even when `db=pg`: its absence alone causes the wizard to run. A PostgreSQL database is never created by the wizard; it is created beforehand with `create_postgres_db.bash`.

Note
The values that the wizard proposes are not always the built-in defaults that apply when a key is absent from the file. For example, the wizard writes `show_logon_stats=yes`, `tlsport=2023`, `max_emails_per_day=4` and `required_conferences="General"`, while an absent key means off, no TLS port, unlimited, and no required conference. The tables in Chapter 2 give the value that applies when a key is absent.

Changing Settings While 3270BBS Runs

No function of 3270BBS other than the setup wizard writes `tsu.cnf`. Two runtime facilities affect configured values without changing the file:

- The administrator command `MOTD "text"` on the command line (main menu option `X`) replaces the message of the day in storage, up to 60 characters including the quotation marks, which become part of the message. Entered without an operand it displays the current message. The change is lost at the next restart unless the `MOTD` key is also edited.
- The SDSF commands `S` and `P` start and stop services (FTPD, HTTPD, SSHD, FINGERD, SMTPD, TN3270TS, PROX3270, WEB3270 and others) for the life of the process. They do not alter the `start_` keys.

The program option `--change-admin-password` resets the password of the user `admin` offline and ends. It reads `tsu.cnf` to find the database and supports SQLite3 only; with `db=pg` it ends with `this command supports SQLite3 only; tsu.cnf says db=pg`.

What Is Mandatory

The configuration loader has a built-in default for every key, and, as stated above, refuses to start only when the file itself cannot be read. In this publication a setting is therefore called *mandatory* when one of the following applies:

1. the setup wizard will not write the file without it; or
2. another setting in the file requests a function that cannot work without it, so that 3270BBS ends, or the service concerned is not started, or the function is silently unavailable.

By the first rule the file itself and two keys are always mandatory:

Key	Values	Default if absent	Effect
`bbs_name`	1 to 10 characters, no blanks	`Forum3270`	The name of the system. It appears in the logon screen line `Welcome to` *`name`*, the FTP greeting, the finger reply, the SSH welcome, the web pages, the title of the Console View, and as the local part of the sender address of system e-mail. It is the identity under which this system posts to federated newsgroups; newsgroups are disabled if it is empty. A longer name is cut to 10 characters with a warning.
`dns_name`	Host name or IP address	none	The public name of the host. The wizard requires it and proposes `localhost`. In this release the loader records the value, but no function of 3270BBS uses it.

Figure 1-6. Keys that are always mandatory

By the second rule the following keys are mandatory when the setting in the first column is present:

When	Mandatory keys	Without them
`db=pg`	`db_name`, `db_user`, `db_password` (`db_host` and `db_port` default to `localhost` and 5432)	The connection fails; 3270BBS displays `Please ensure the PostgreSQL database is accessible with the provided credentials.` and ends.
`db=sqlite3 (default)`	The file `tsu.db`	The wizard runs. Without the wizard, startup ends with `database 'tsu.db' not found`.
`start_tls=yes`	`tlsport`, `tlscert`, `tlskey`	`Warning: TLS server not started – missing configuration`, followed by the values found. A named file that does not exist gives `TLS certificate file` *`name`* `not found` or `TLS key file` *`name`* `not found`.
`HTTPS (start_httpd=yes)`	`tlscert`, `tlskey`	`HTTPS server not started – no TLS certificate configured`, or `HTTPS certificate file` *`name`* `not found, skipping HTTPS server` (likewise for the key file); plain HTTP runs alone.
`start_smtpd=yes`	`smtp_domain`, a name with at least one dot	`SMTP server not started – no smtp_domain configured` or `... – smtp_domain must be an FQDN, not a TLD`.

Figure 1-7. Conditionally mandatory keys (services)

When	Mandatory keys	Without them
`verify_newuser_email=yes, notify_admin_new_accounts=yes`	`sendgrid_api_key`	The function is not performed; a red warning is written for verification.
`E-mail to Internet addresses`	`sendgrid_api_key`, `smtp_domain`	Users cannot send mail outside the BBS.
`Newsgroups`	All five `newsgroup_db_*` keys and `bbs_name`	`Newsgroups: Disabled` followed by `missing:` *`keys`*.
`Global chat`	All four `globalchat_db_*` connection keys	Chat stays local to this system; nothing is logged.
`remote`*`n`*`=`*`name`	`remote`*`n`*`_addr`, `remote`*`n`*`_port`	The entry is left out of the Doors list.

Figure 1-8. Conditionally mandatory keys (functions)

Security of a New Installation

A newly created database contains two accounts with well-known passwords: `admin` (password `admin`), the administrator, and `noreply` (password `noreply`), the system account that sends automatic messages. Both passwords must be changed before the system is opened to users. If the administrator password is lost on a SQLite3 system, it can be reset with the program option `--change-admin-password`.

A Minimal Configuration

The following file is complete and sufficient for a system that keeps its data in SQLite3, accepts TN3270 connections on port 3270, serves the web interface on port 9000, and offers one host on the Doors list. Keys whose built-in default is wanted could be omitted; they are shown here so that the services in use can be seen at a glance.

Example

```
# tsu.cnf - minimal configuration for a 3270BBS on SQLite3
#
# Mandatory
bbs_name=MyBBS
dns_name=bbs.example.com

# Database: the local file tsu.db (it must exist)
db=sqlite3

# TN3270 listener (plain text)
port=3270

# Services
start_httpd=yes
httpd_port=9000
start_ftpd=no
start_proxy3270=yes
start_sshd=no
start_tls=no

# Shown on the main and extended menus
MOTD="Welcome to MyBBS"

# Conferences that users cannot leave
required_conferences="General"

# One entry on the Doors list (extended menu option 4)
remote1=TK5
remote1_description="MVS 3.8j TK5 system"
remote1_addr=mvs.example.org
remote1_port=3270
```

Figure 1-9. A minimal tsu.cnf

For PostgreSQL, the line `db=sqlite3` is replaced by the following, and `tsu.db` must still be present:

```
db=pg
db_host=localhost
db_port=5432
db_name=tsu
db_user=tsu
db_password="password"
```

Figure 1-10. Database lines for PostgreSQL

Chapter 2

The Configuration File: Optional Settings

This chapter describes every key of `tsu.cnf` that is not mandatory, grouped by the function it controls. For each key the tables give the values allowed, the value that applies when the key is absent from the file, and the effect. Unless a key is listed in Figure 1-3, a change takes effect at the next restart. The rules of syntax in Chapter 1 apply throughout; in particular a yes/no key accepts `yes`, `true`, `1`, `on` and their opposites, and an unusable value leaves the default in force.

The keys `bbs_name` and `dns_name` are described in Figure 1-6.

Screens and Community

Key	Values	Default	Effect
`MOTD`	Text	empty	The message of the day, centered on one line of the main and extended menus; cut at 78 characters. Can be replaced until restart with the `MOTD` command.
`show_logon_stats`	yes/no	no	`yes` adds **F2**=About to the logon screen, which displays the pre-logon About screen. Read each time the logon screen is shown.
`chat_typing_indicator`	yes/no	yes	The `..` marker in chat that shows who is typing. See below.
`required_conferences`	Comma-separated list of conference names	none	Conferences from which users cannot unsubscribe. See below.

Figure 2-1. Keys for screens and community

chat_typing_indicator. The typing marker works by reading the terminal's input field periodically. This key is the switch for all such polling, not only in chat: the live searches (the user rolodex, the administrator's User Management, and Find Username in mail) and the Auto Update of the performance monitor use it too. With `no`, these functions act only when **ENTER** is pressed.

required_conferences. Each name may be enclosed in double quotes, for example `required_conferences="General","Help"`. Names are compared without regard to case. If the key appears on more than one line, all the lists are used. A `#` that follows a blank or a tab starts a comment even inside quotes, so a name containing a blank followed by `#` cannot be listed; the setup wizard refuses any `#` in this field. A user who tries to leave such a conference receives `Cannot unsubscribe from` *`name`*`: this is a required conference`.

TN3270 and TLS

Key	Values	Default	Effect
`port`	1-65535	3270	Port of the plain TN3270 listener. This listener is always started.
`start_tls`	yes/no	no	Starts the TLS-encrypted TN3270 listener (service TN3270TS) at startup.
`tlsport`	1-65535	none	Port of the TLS listener. Without it no TLS listener is started at startup; `S TN3270TS` then uses port 12001.
`tlscert`	File name	none	Certificate file (PEM) for the TLS listener and for HTTPS.
`tlskey`	File name	none	Private key file (PEM) belonging to `tlscert`. It must be protected from other users of the host.

Figure 2-2. Keys for TN3270 and TLS

If the plain TN3270 port cannot be bound, the other services except web3270 stay up and 3270BBS displays, repeatedly, two lines, the second of which reads `Ctrl-C, set port correctly in tsu.cnf, restart`; it then waits for the operator. One certificate and key pair serves both the TN3270 TLS listener and the HTTPS server.

Web Interface and web3270

Key	Values	Default	Effect
`start_httpd`	yes/no	yes	Starts the web interface: conferences and topics, notes, and the administrator's system and topic pages. It also carries HTTPS and web3270.
`httpd_port`	1-65535	9000	Port of the plain HTTP server.
`https_port`	1-65535	9443	Port of the HTTPS server, which is started with HTTP when `tlscert` and `tlskey` name existing files.
`start_web3270`	yes/no	no	Enables the browser 3270 terminal at `/web3270` on the HTTP and HTTPS ports. Needs `start_httpd=yes`.
`web3270_trusted_proxies`	Comma-separated CIDRs or IP addresses	empty	Peers whose `X-Forwarded-For` header is believed. See below.

Figure 2-3. Keys for the web interface and web3270

web3270. The browser terminal is locked to `localhost` and to the plain TN3270 `port` of this system, so that it cannot be used to reach other hosts. It accepts at most 50 sessions in all and 5 per client address. These caps and the same-origin check on the WebSocket are its only controls: the lock is a restriction of the target, not authentication.

web3270_trusted_proxies. Behind a reverse proxy every client arrives from the proxy's address, so the 5-per-address cap would apply to the whole service. Listing the proxy here makes 3270BBS take the client address from `X-Forwarded-For` for web3270, and also for the web interface's login rate limit and firewall checks. A bare address is taken as a `/32` or `/128`. An entry that cannot be parsed is skipped with the message `web3270: ignoring unparseable trusted proxy "`*`entry`*`"`. The key must stay empty when the BBS is reached directly, since the header is otherwise supplied by the client.

Note

3270BBS has no Host allowlist for web3270, so DNS rebinding is not mitigated: the WebSocket origin check compares `Origin` with the `Host` header, both of which an attacking page supplies. 3270BBS also never sends `Strict-Transport-Security`. HSTS applies to a host name, not a port, and because the same `dns_name` serves plain HTTP on `httpd_port`, a single HSTS reply would make browsers send TLS to the plain HTTP port and break `/web3270` for a year. The administrator must not add HSTS in a proxy in front of 3270BBS for the same reason.

Other Network Services

Key	Values	Default	Effect
`start_ftpd`	yes/no	yes	Starts the FTP server, through which users transfer their notes.
`ftp_port`	1-65535	2100	Port of the FTP server.
`ftp_limit`	Kilobytes, 1 or more	20	Largest file a user may upload by FTP. 0 or a negative value means 20, not unlimited.
`start_sshd`	yes/no	no	Starts the SSH server: live chat, browsing of conferences and topics, SDSF and the clock from any SSH client.
`sshd_port`	1-65535	2222	Port of the SSH server.
`start_fingerd`	yes/no	no	Starts the finger daemon, which answers queries about users and, for an empty query, about the system.
`fingerd_port`	1-65535	79	Port of the finger daemon. Port 79 normally requires privileges.
`start_proxy3270`	yes/no	yes	Starts PROX3270, which connects users to the hosts on the Doors list. Without it the list answers `PROX3270 disabled`.

Figure 2-4. Keys for other network services

The SSH server uses the host key in `ssh_host_key.pem`, which it creates on first start if the file does not exist. The key must be kept, or returning SSH users are warned that the host key has changed.

Database

Key	Values	Default	Effect
`db`	`sqlite3` (also `sqlite`), `pg` (also `postgres`, `postgresql`)	sqlite3	The database engine. An empty value keeps the default; an unknown value keeps it with a red warning.
`db_host`	Host name or address	localhost	PostgreSQL server. Used only with `db=pg`.
`db_port`	Port	5432	PostgreSQL port. Used only with `db=pg`.
`db_name`	Name	none	PostgreSQL database, as created by `create_postgres_db.bash`.
`db_user`	Role name	none	PostgreSQL role that 3270BBS connects as.
`db_password`	Text	none	Password of that role, stored in clear text.

Figure 2-5. Keys for the database

With SQLite3 all data is kept in `tsu.db` in the current directory and nothing else is installed. The PostgreSQL connection is made without TLS (`sslmode=disable`); the database server should therefore be on the same host or on a private network. The maintenance scripts (for example `create_postgres_db.bash`, `migrate_chat_source.bash` and the `prune_`/`erase_` scripts) read the same `db` and `db_*` keys from `tsu.cnf`.

Outbound E-mail

3270BBS sends e-mail through the SendGrid service. System mail (verification codes, administrator notices, PDF documents, newsgroup digests) is sent from *`bbs_name`*`@`*`smtp_domain`*, or from *`bbs_name`*`@3270bbs.com` when `smtp_domain` is not a usable domain name. Mail that a user sends to an Internet address is sent from *`username`*`@`*`smtp_domain`*, and forwarded mail from `noreply@`*`smtp_domain`*; without `smtp_domain` these are not sent. The sending domain must be one that the SendGrid account is permitted to send for.

Key	Values	Default	Effect
`sendgrid_api_key`	API key	none	Enables all outbound mail: verification codes, administrator notices, mail to Internet addresses (also needs `smtp_domain`), forward and reply on mail received from the Internet, newsgroup digests, and the e-mail functions of the BASIC and assembler interpreters.
`verify_newuser_email`	yes/no	no	A new user must enter a 4-digit code sent to the e-mail address given at registration.
`notify_admin_new_accounts`	yes/no	no	Sends a notice of each new registration to the e-mail address of the administrator account.
`max_emails_per_day`	0 or more	0	E-mails a non-administrator may send per day. 0 means unlimited.
`new_users_sendban`	Days	14	Days after registration during which a non-administrator may not send e-mail or PDFs. 0 or less turns the restriction off.

Figure 2-6. Keys for outbound e-mail

The value of `new_users_sendban` in force is logged at startup as `NEW USERS EMAIL BLOCK` *n* `DAYS`. The key is conventionally written `SENDGRID_API_KEY`; the script `solicit_old_users.bash` finds it only in that spelling.

Inbound E-mail

Key	Values	Default	Effect
`start_smtpd`	yes/no	no	Starts the SMTP server, which delivers mail for *`user`*`@`*`smtp_domain`* to the user's BBS mailbox, with the sender shown as `smtp`.
`smtp_port`	1-65535	2525	Port of the SMTP server. Internet mail arrives on port 25, which is normally forwarded to this port.
`smtp_domain`	Domain name with at least one dot	none	The mail domain. Required by SMTPD and by mail to Internet addresses; also the domain of the outbound sender address. Its MX record must point to this host.
`smtp_drop_dimarc`	yes/no	yes	Discards inbound mail addressed to the local user `dimarc`, logging `SMTP: drop dimarc from` *`sender`*.

Figure 2-7. Keys for inbound e-mail

Remote Hosts (Doors)

Extended menu option 4, Doors, lists other 3270 systems to which users may connect through PROX3270. Each host is defined by a group of keys:

Key	Values	Default	Effect
`remote`*`n`*	Short name	none	Begins a host entry; the name is shown in the list.
`remote`*`n`*`_description`	Text	empty	Description shown beside the name.
`remote`*`n`*`_addr`	Host name or address	none	Address of the remote TN3270 server.
`remote`*`n`*`_port`	Port	none	Port of the remote TN3270 server.

Figure 2-8. Keys for a remote host

Any key that begins with `remote` and contains no underscore starts a new entry, and the keys that follow with the same prefix and an underscore complete it; the number *n* need not be consecutive, and entries are listed in the order of the file. An entry without an address or a port is left out. The list shows at most 15 hosts on a Model 2 terminal, 24 on a Model 3 and 35 on a Model 4. The keys are read each time the list is displayed, so hosts can be added without a restart. If no entry is complete, the list answers `No remote hosts configured in tsu.cnf`.

News and AI Assistance

Key	Values	Default	Effect
`newsapikey`	API key of newsapi.org	none	Enables the command `NEWS` on the main and extended menus, which shows headlines. Without it: `News feature not configured`.
`openai_api_key`	OpenAI API key	none	Enables AI correction behind **`F2`**, the editor commands `IMPROVE`, `TRANSLATE` and `UNDO`, and the `@ai` chat participant. See below.

Figure 2-9. Keys for external services

openai_api_key. At startup, before any listener is opened, 3270BBS checks the key against OpenAI for two models, with a combined limit of 5 seconds. Model `gpt-5.4-nano` enables **`F2`** correction in chat, private chat and the editor; model `gpt-5.4-mini` enables `IMPROVE`, `TRANSLATE` and `@ai`. The console shows `No OpenAI API key found` (yellow) when the key is absent, and otherwise `OpenAI API key found and validated` (green) or `OpenAI API key found but not validated` (red), followed by the result for each model. A failure is never fatal; the dictionary **`F2`** is used instead. The `@ai` participant also needs the account `AI-bot`, which 3270BBS creates if it does not exist.

Text that a user checks, improves, translates, or addresses to `@ai` is sent to OpenAI, and `@ai` questions may cause OpenAI to run web searches. The key is never written to the log, nor is any OpenAI error reply. The separate program `3270bbschatbot` must not run while this key is set: it posts as the same `AI-bot` account, and both would answer.

Federation: Global Chat and Newsgroups

Two functions are shared with other 3270BBS systems through PostgreSQL servers of their own, separate from the one named by the `db_*` keys. Neither is offered by the setup wizard, which writes them only as comments. Both connections are made without TLS.

Key	Values	Default	Effect
`globalchat_db_address`	Host	none	The global chat server. The database name is always `globalchat`. With all four keys set, startup logs `GlobalChat: Connected (`*`host`*`:`*`port`*`)` or `GlobalChat: FAILED`.
`globalchat_db_port`	Port	none	
`globalchat_db_user`	Role	none	
`globalchat_db_password`	Text	none	
`globalchat_pollrate`	Number above 0	none	Accepted but not used. The poll interval is computed from activity, between 1 and 3 seconds.

Figure 2-10. Keys for global chat

In this release the Federated Chat screen is disabled in the menus (`Federated chat is disabled`). The only visible effect of the global chat keys is the third number of the online counts on the logon screen, which gives the users active in global chat during the last five minutes.

Key	Values	Default	Effect
`newsgroup_db_address`	Host	none	The newsgroups server. When all five keys and `bbs_name` are set, startup logs `Newsgroups: Connected (`*`host`*`:`*`port`* `as` *`bbs_name`*`)` or `Newsgroups: FAILED`, and the newsgroup screens can be reached with `=G` from either menu. The database is created with `create_newsgroups_db.bash`.
`newsgroup_db_port`	Port	none	
`newsgroup_db_user`	Role	none	
`newsgroup_db_password`	Text	none	
`newsgroup_db_name`	Name	none	

Figure 2-11. Keys for newsgroups

Without the newsgroups keys, `=G` answers `Newsgroups feature not available`. Option `G` of the extended menu itself answers `Newsgroups is disabled` in this release, whatever the configuration. Newsgroup e-mail digests additionally need `sendgrid_api_key`.

Keys Without Effect and Obsolete Keys

The following keys are accepted by the loader but have no effect in this release:

Key	Status
`dns_name`	Recorded but not used (it remains mandatory for the wizard).
`mail_listen_port`	Checked as a port and recorded, but no listener uses it.
`globalchat_pollrate`	Checked as a number and recorded, but not used.

Figure 2-12. Keys accepted without effect

The following keys occur in older configuration files but are not read by 3270BBS. Being unknown keys, they are ignored without a message and can be removed:

Key	Status
`chatgpt_key`	Read only by the separate program `3270bbschatbot`, never by 3270BBS. It is not a substitute for `openai_api_key`.
`discord_token, discord_guild_id, show_discord_in_menu`	Not read by any program.

Figure 2-13. Obsolete keys

Limits That Are Not Configurable

Several limits are built into the program and have no key. They are listed here so that the administrator does not look for one: at most 7 TN3270 connections from one address (80 from the local host and local interfaces), plain and TLS together; at most 50 web3270 sessions, 5 from one address; at most 20 finger connections, 3 from one address, and 5 finger queries from one address in 30 seconds. Logging has no keys; the BBS log is displayed by the SDSF `LOG` command.

Chapter 3

Administrator Functions: Overview

This chapter describes how a user becomes an administrator of 3270BBS, what the main menu of an administrator contains, and which functions throughout the system are reserved for administrators. The chapters that follow describe each administrator function in detail: Chapter 4 the management of user accounts, Chapter 5 the management of content, Chapter 6 the system activity display and the control of services, Chapter 7 database maintenance, and Chapter 8 the operator console and the other interfaces available to the system operator.

How a User Becomes an Administrator

The authority of an administrator is a property of the user account: the account carries an *admin* flag in the database. 3270BBS has no separate list of administrators and no other means of granting the authority.

- A new database contains the account `admin`, which has the flag set. Its initial password is `admin` and must be changed before the system is opened to users (see Chapter 1).
- An administrator grants the authority to another user by typing `Y` in the `Admin (Y/N)` field of the Edit User Profile screen, and withdraws it by typing `N`; see “Editing a User Profile” in Chapter 4. The `Moderator (Y/N)` field on the same screen grants and withdraws the moderator authority in the same way.
- If the password of the account `admin` is lost, it is reset with the program option `--change-admin-password` while 3270BBS is stopped (see Chapter 1). The self-service password recovery of the logon screen refuses every administrator account; it displays the same failure message as for any other failure, so that it does not reveal that the account is an administrator.

An administrator cannot close his or her own account from the profile screen; the attempt is rejected with `Admin accounts cannot be deleted for security reasons`.

The Administrator's Main Menu

After logon, an administrator sees the main menu shown in Figure 3-1. It differs from the menu of other users in two respects: four additional options, and a line of system statistics above the message of the day. (The stock ticker, if enabled in the profile, also runs for an administrator while the market is closed.)

```
                      3270BBS - a 3270 BBS                                1
Option ===>

1  Conferences       Organized community discussions     User ID . : admin
2  My Subscriptions  Manage conference subscriptions     Time. . . : 8:32p
3  Search Content    Full text search                    Online .  : 4
4  Mail              Send and receive Mail               In chat . : 1
L  One Liners        Short messages to community         Unread Msg: Yes
R  Chat              Local real-time chat                Release . : 4.2.8
U  User Rolodex      Look up users                       Terminal. : 2-310
N  Notes             Personal notes
S  SDSF              System activity                        October   2026
0  Edit Profile      Update your account information     Su Mo Tu We Th Fr Sa
6  Admin Users       Manage user accounts                             1  2  3
7  Admin Topics      Manage topics                        4  5  6  7  8  9 10
8  Admin Posts       Manage posts                        11 12 13 14 15 16 17
D  DB Maint          Database maintenance                18 19 20 21 22 23 24
M  Extended Menu     More applications                   25 26 27 28 29 30 31
X  Logoff            Exit to TSO
                                                            Day of year 276
Users: 11   Mail:  3    Topics: 9    Posts: 17   Notes: 1    Logons/24h: 34

                      Welcome to the 3270BBS test system
F1=Help F2=WhatsNew F4=Summon F5=VirtualSess F6=SysInfo F10=Month- F11=Month+
```

Figure 3-1. The main menu of an administrator (Model 2, 24 x 80; capture screens/adm-main-menu.txt)

Option	Name	Function
6	Admin Users	Lists the user accounts and edits, resets the password of, or closes any of them (Chapter 4).
7	Admin Topics	Manages the topics of every conference (Chapter 5). A moderator sees the same option under the name `Mod Topics`.
8	Admin Posts	Manages the posts of every topic (Chapter 5). A moderator sees the same option under the name `Mod Posts`.
D	DB Maint	Displays the database maintenance screen (Chapter 7).

Figure 3-2. Main menu options reserved for administrators

If a user who is not an administrator types `6` or `D`, the menu displays `Access denied. Admin privileges required.`; for `7` and `8` a user who is neither an administrator nor a moderator receives `Access denied. Admin or Moderator privileges required.` From the extended menu, the options are reached as `=6`, `=7`, and `=8`.

The Statistics Line

The statistics line, two lines above the message of the day, is displayed only to administrators. It is recalculated each time the menu is displayed.

Field	Meaning
`Users:`	The number of user accounts that are not closed.
`Mail:`	The number of mail messages stored.
`Topics:`	The number of topics in all conferences.
`Posts:`	The number of posts in all topics.
`Notes:`	The number of notes of all users.
`Logons/24h:`	The number of logons recorded in the last 24 hours.

Figure 3-3. Fields of the administrator's statistics line

Commands Reserved for Administrators

The following commands may be typed at the `Option ===>` prompt of either menu. When a user who is not an administrator enters `LOG` or `FIREWALL`, the menu is redisplayed without a message, as though nothing had been typed; for `SMTPMON` the menu displays `Access denied. Admin privileges required.`

Command	Function	Described in
`LOG`	Displays the system log.	Chapter 6
`FIREWALL`	Displays firewall administration.	Chapter 6
`SMTPMON`	Displays the SMTP performance monitor. `M;SMTPMON` does the same from the main menu and returns to the extended menu.	Chapter 6

Figure 3-4. Menu commands reserved for administrators

The command `COMMANDS` lists every command that the user may enter. For an administrator the list contains an additional section, headed `ADMIN`, as shown in Figure 3-5. **`ENTER`** shows the next page, and **`F3`** closes the list.

```
                      3270BBS - a 3270 BBS                                 1
Option ===>

 Commands available to you - Main Menu

 TYPED COMMANDS                        MAIL     Mail: MAIL <user|address>
 SD       SDSF system activity         WHOIS    User card: WHOIS <user>
 CLOCK    Wall clock                   STOCK    Stock quote: STOCK <sym>
 BALLOON  Balloon game                 CLEAR    Clear the link clipboard
 CHECKERS Checkers game                COMMANDS Show this command list
 CONSOLE  MVS operator console         ADMIN
 NEWS     News headlines               LOG      View the BBS log
 DBMON    DB transaction monitor       FIREWALL Firewall administration
 DSLIST   Data set list utility        SMTPMON  SMTP performance monitor
 LASTPOST Latest post; -n = nth last

 F3=Close
                                                        Day of year 276
Users: 11   Mail:  3    Topics: 9    Posts: 17   Notes: 1    Logons/24h: 34

                      Welcome to the 3270BBS test system
F1=Help F2=WhatsNew F4=Summon F5=VirtualSess F6=SysInfo F10=Month- F11=Month+
```

Figure 3-5. The command list of an administrator, with the ADMIN section (Model 2, 24 x 80; capture screens/adm-commands.txt)

Administrator Privileges Elsewhere in the System

Apart from the options and commands described above, an administrator has the following additional abilities on screens that every user sees. Each is described further in the chapter indicated.

Where	What the administrator may do
User Rolodex	**F12** on a user opens the Edit User Profile screen for that user (Chapter 4).
SDSF	Enter operator commands, and use **F4**, **F8**, **F10**, **F11**, and **F12**; **F2** shows the login history instead of held output (Chapter 6).
Held output	Display, purge, and mail the held output of every user, and the system logs of earlier runs (Chapter 6).
MVS console	Start and stop services and shut the system down (Chapter 6).
Conference administration	Change the Admin Only attribute of a conference (Chapter 5).
Mail	Send a message to all users by addressing it to ALL (Chapter 5).
TSO command line	The commands MOTD and RESET LOCKOUT (Chapters 5 and 4).
Data set list	Edit and delete the community data sets (Chapter 5).
Marketplace	Edit the listing of any user (Chapter 5).
E-mail	No daily limit applies to the administrator's outbound Internet mail or printed output sent by mail (Chapter 5).
Edit Profile	The monitor refresh rate may be set from 1 to 5 seconds (other users: 3 to 10).
DBMON, telemetry	**F9** and **F10** adjust the refresh from 0.5 to 5 seconds (other users: 3 to 10).
Stock Quotron	Quotes may be refreshed with **ENTER** every 6 seconds (other users: every 120 seconds). **F7** displays a test price-alert window for the first symbol of the list.

Figure 3-6. Administrator privileges on common screens

Functions that administrators share with moderators (topic and post management, conference administration, the chat topic, the editing of one-liners, and newsgroup management) are described in Chapter 9, Moderator Functions. Chapter 5 describes only where the administrator's version differs.

The Administrator's Screen Saver

When the main menu or the extended menu has received no input for the screen saver timeout specified in the user's profile (1 to 30 minutes; the default is 4), the screen saver starts, provided that it is enabled in the profile. For an administrator the screen saver is a dashboard of the system rather than the screen saver that other users see.

```
ADMIN DASHBOARD                    20:37
CPU %   23.0 ----
MEM MB  20.7 ----
Users      1 -
InChat     0 -
DB ms   0.11 -
LOGONS: 1H                  24H
   __     ____     __     ____
  /. |   ( __ \   /. |   / _  \
 (_  _)   (__ (  (_  _)  ) _  (
   (_)    (____/    (_)   \____/

 000000
00    00
00    00
00    00
00    00
00    00
00    00
 000000

  11
 111
1111
  11
  11
  11
  11
  11
111111
```

Figure 3-7. The administrator's dashboard screen saver (Model 2, 24 x 80; capture screens/adm-screensaver.txt)

The box headed `ADMIN DASHBOARD` shows the time and the following figures, each with a bar and a trend marker: processor use (`CPU %`), storage in megabytes (`MEM MB`), users logged on (`Users`), users in chat (`InChat`), and the average database transaction time (`DB ms`). Below them, `LOGONS:` gives the number of logons in the last hour (`1H`) and in the last 24 hours (`24H`). Beside the box, large digits show the number of users logged on and the number of users in chat; on a display with more than 24 rows the number of unread mail messages is shown as well. The box moves to another corner of the screen every 35 seconds, and the figures are refreshed every second. If the stock ticker is enabled in the profile, it is shown even when the market is closed. Any key returns to the screen from which the screen saver started. The screen saver started by option `M` of the extended menu is the ordinary one, for administrators as for other users.

Chapter 4

Managing Users

This chapter describes the user management screens: the list of user accounts, the Edit User Profile screen, the Reset Password screen, the closing of accounts, and the list of closed accounts. It also describes how a login lockout is cleared. All the screens in this chapter are available only to administrators; each screen checks the authority again when it is displayed and returns any other user to the main menu with `Admin privileges required`.

The User Management List

To display the list of user accounts, select option `6` from the main menu.

```
Total users: 11               User Management               Page 1/1
Search:
S ID    Username   Email                         Adm/Mo AboutMe Last Login
*******************************************************************************
  1     admin      admin@example.com             Adm    NO       3Oct26 15:28
  2     noreply    noreply@example.com           None   NO              Never
  3     smtp       smtp@localhost.local          None   NO              Never
  4     bcooper    bcooper@example.com           None   NO       3Oct26 18:27
  5     jsmith     jsmith@example.com            None   NO       2Oct26 20:27
  6     mlopez     mlopez@example.org            Mod    NO       3Oct26 17:27
  7     akim       akim@example.net              None   NO      28Sep26 20:27
  8     rpatel     rpatel@example.com            None   NO       3Oct26 19:57
  9     tnguyen    tnguyen@example.com           None   NO      13Sep26 20:27
  10    dwilson    dwilson@example.org           None   NO              Never
  11    ekowalski  ekowalski@example.com         None   NO      24Sep26 20:27





D delete, E edit, P change password.

F2=Top F3=Menu F5=AboutUsr F7=Up F8=Down F10=Bottom ENTER=Search F12=Closed
```

Figure 4-1. The User Management list (Model 2, 24 x 80; capture screens/adm-users-list.txt)

The heading shows the number of accounts (`Total users:`), the title, and the page number. While a search is in effect, the count reads `Matching:` and the title reads `Users matching '`*`pattern`*`'`. The accounts are listed in order of user ID; there is no other sort order. The number of accounts on a page is 17 on a Model 2, 25 on a Model 3, and 36 on a Model 4.

Column	Meaning
`S`	The selection field, in which a selection code is typed.
`ID`	The user ID, a number assigned when the account was created.
`Username`	The name under which the user logs on.
`Email`	The mail address of the user, truncated to 28 characters.
`Adm/Mo`	`Adm` for an administrator, `Mod` for a moderator, `Adm/Mo` for a user who is both, and `None` for any other user.
`AboutMe`	`YES` if the user has written a `PUBLIC` note, otherwise `NO`.
`Last Login`	The date and time of the last logon, in the time zone of the administrator, or `Never`.

Figure 4-2. Columns of the User Management list

The accounts `noreply`, `smtp` and `AI-bot` are system accounts created by 3270BBS itself; they are used for automatic messages, for mail received from the Internet, and for the answers of the `@ai` chat participant, and nobody logs on with them. None of the three can be closed: `D` on one of them is refused with `The` *`name`* `system account cannot be deleted`.

Searching

Type the beginning of a user name in the `Search:` field. The list is redrawn as the characters are typed, provided that the cursor is in the search field and no selection code has been typed. The search ignores the case of letters, always starts again at page 1, and discards any selection codes already typed. To end the search, erase the field and press **`ENTER`**. If the list is redrawn at the moment a key is pressed, the message `List changed while you typed - check your selection` is displayed, and the selections should be checked before they are entered again.

Selection Codes

Type a code in the `S` column beside one or more users and press **`ENTER`**. The codes may be typed in either case.

Code	Action
D	Closes the account; see “Closing an Account”. Several users may be marked D at once; all are shown on one confirmation screen.
E	Displays the Edit User Profile screen. Only one user may be marked.
P	Displays the Reset Password screen. Only one user may be marked.

Figure 4-3. Selection codes on the User Management list

There is no selection code that bans a user or that grants the administrator or moderator authority; the authorities are changed on the Edit User Profile screen, and a ban applies to a single conference (see Chapter 5). The following messages may result from the selections:

Message	Explanation
`Invalid selection`	A code other than D, E, or P was typed, or D was combined with another code.
`Please select only one operation type at a time`	E and P were both typed.
`Please select only one user to edit`	More than one user was marked E.
`Please select only one user to reset password`	More than one user was marked P.
`You cannot delete your own account`	The administrator marked his or her own account D.
`The noreply system account cannot be deleted`	The account `noreply` was marked D.
`Error deleting user: the smtp system account cannot be deleted`	Shown on the confirmation screen when **ENTER** is pressed with the account `smtp` marked.

Figure 4-4. Messages on the User Management list

The following function keys are valid on this screen:

Key	Function
F2	Displays the first page.
F3	Returns to the main menu.
F5	Displays the PUBLIC note of the user on whose line the cursor is placed. **F3** on the note returns to the list with the page and the search unchanged.
F7, F8	Display the previous and the next page.
F10	Displays the last page.
F12	Switches between the list of active accounts and the list of closed accounts.
ENTER	Performs the search, or the actions marked in the S column.

Figure 4-5. Function keys on the User Management list

Editing a User Profile

The Edit User Profile screen is displayed by the selection code E on the User Management list, or by **F12** with the cursor on a user in the User Rolodex (option U of the main menu). For an administrator the key legend of the rolodex ends with F12=Admin. When the screen was reached from the rolodex, it returns to the rolodex.

```
                              Edit User Profile - Admin


User ID:       4

Username:      bcooper

Email:         bcooper@example.com

Password Hash: 5b11618c2e44027877d0cd0921ed16
New Password:
City:          Denver

Country:       USA

Admin (Y/N):   N                                  Moderator (Y/N):  N

Time Zone:     UTC


Press Enter to save, F3 to cancel. Leave New Password blank to keep current.

F1=Help  F3=Cancel  ENTER=Save Changes
```

Figure 4-6. The Edit User Profile screen (Model 2, 24 x 80; capture screens/adm-user-edit.txt)

Field	Description
`User ID`	The user ID. It cannot be changed.
`Username`	The user name. A new name must obey the rules for registration: 6 or 7 characters, letters and digits only, not beginning with a digit, and not a reserved name. If the existing name is longer than the field, the field is protected and the screen says `(name longer than the field; cannot be changed here)`.
`Email`	The mail address. It must not be blank; a changed address must contain `@` and a domain with a dot.
`Password Hash`	The first 30 characters of the stored password hash. It cannot be changed. A hash beginning `$2` is a bcrypt hash; any other is the older SHA-256 form, which is replaced by a bcrypt hash at the user's next logon.
`New Password`	A new password, 6 to 22 characters. Leave the field blank to keep the current password. The cursor is placed here when the screen is displayed.
`City`	Free text.
`Country`	The country. A recognized name is stored in its standard form; any other text is stored as typed, with a warning (see below). A blank field clears the country.
`Admin (Y/N)`	`Y` grants the administrator authority; `N` withdraws it.
`Moderator (Y/N)`	`Y` grants the moderator authority; `N` withdraws it.
`Time Zone`	The time zone of the user, used for the times displayed to that user.

Figure 4-7. Fields of the Edit User Profile screen

Press **ENTER** to save the changes, **F3** to leave the screen without saving, or **F1** to display help (the typed values are kept). When the changes are saved, the list shows *name* `updated`, or *name* `updated (password changed)` if a new password was entered, followed by any note about the country, such as `Country saved as` *X* or `Country '`*x*`' is not a known country (did you mean` *Y*`?)`. An unrecognized country never prevents the other changes from being saved.

Message	Explanation
`Username must be at least 6 characters long`	The new user name is too short.
`Username must be at most 7 characters long`	The new user name is too long.
`Username cannot start with a number`	The new user name begins with a digit.
`Username can only contain letters and numbers (no special characters)`	The new user name contains another character.
`That username is reserved. Please choose another.`	The name is one that 3270BBS reserves for itself: `noreply` or `closed`. (The shorter reserved names fail the length rule first.)
`Invalid email address`	The mail address is not in a valid form.
`Password must be at least 6 characters long`	The new password is too short.
`Password too long (max 22 characters). Please try again.`	The new password is too long.

Figure 4-8. Messages on the Edit User Profile screen

Resetting a Password

The Reset Password screen is displayed by the selection code `P` on the User Management list. It is the means by which an administrator gives a user who has forgotten the password a new one.

```
                              Reset Password

          User:               bcooper

          Current Hash:       65c49a0a0d3d7ea4d1aeaacd54bc4ab7101c43f93deba...

          New Password:

          Confirm Password:









  F1=Help  F3=Cancel  ENTER=Save Password
```

Figure 4-9. The Reset Password screen (Model 2, 24 x 80; capture screens/adm-user-passwd.txt)

The screen shows the user name and the stored hash (`Current Hash`). A hash longer than 48 characters, which includes every bcrypt and SHA-256 hash, is shortened to its first 45 characters followed by **`...`**. Type the new password in `New Password` and again in `Confirm Password`, and press **`ENTER`**. Both fields must be filled in. The password must be 6 to 22 characters long; it is stored as a bcrypt hash. If the two entries differ, the screen displays `New passwords do not match. Please try again.` When the password has been reset, the list shows `Password for` *`name`* `is reset`. **`F3`** leaves the screen without changing the password, and **`F1`** displays help.

The new password must be given to the user by some other means than 3270BBS mail, which the user cannot read until logged on. 3270BBS does not notify the user of the change.

Closing an Account

The selection code `D` on the User Management list displays a confirmation screen that names each user marked.

```
                              Confirm Delete



          Are you sure you want to delete 1 user(s)?

          Users to delete:
            - ofarrel









          Press ENTER to confirm deletion, or F3 to cancel

  F3=Cancel  ENTER=Confirm Delete
```

Figure 4-10. Confirming the closing of an account (Model 2, 24 x 80; capture screens/adm-user-delete.txt)

Press **ENTER** to close the accounts, or **F3** (or any other key) to cancel. When the accounts have been closed, the list shows *n* `user(s) deleted`. If more users are marked than fit on the screen, the last line reads `...` `and` *n* `more`.

Although the screens speak of deletion, the account is *closed*: it is the same operation that a user performs with `F9=CloseAccount` on the profile screen. Its effects are as follows, and are performed in one database transaction:

- The user can no longer log on. The stored password is replaced by a value that matches no password, and the account is marked closed.
- The user's notes, mail (both the messages the user sent and those the user received, so that copies also disappear from the other users' mail), marketplace listings, blocked-sender list, conference subscriptions, topic notification settings, and activity records are deleted.
- The user's topics, posts, chat lines, one-liners, and likes are kept. Wherever the author's name would be shown, the name `closed` is shown instead. Replies that other users left in the user's topics are therefore not lost.
- The user name remains in the database and can never be registered again.

Caution
Closing an account cannot be undone from any screen. The closed account cannot be reopened, and the deleted notes and mail cannot be recovered except from a backup of the database. An administrator may close the account of another administrator; only the administrator's own account and the system accounts `noreply` and `smtp` are protected.

The List of Closed Accounts

F12 on the User Management list displays the closed accounts, and **F12** again returns to the active accounts.

```
Closed accounts: 1            Closed Accounts               Page 1/1
Search:
S ID    Username   Email                        Adm/Mo AboutMe Closed On
*******************************************************************************
  12    ofarrel    ofarrel@example.com          None   NO       3Oct26 20:29 ***********************************************************************************

Closed accounts are read-only.

F2=Top F3=Menu F5=AboutUsr F7=Up F8=Down F10=Bottom ENTER=Search F12=Active
```

Figure 4-11. The list of closed accounts (Model 2, 24 x 80; capture screens/adm-users-closed.txt)

The list has the same layout and the same keys as the list of active accounts, except that the heading reads `Closed accounts: n` and `Closed Accounts`, the last column, `Closed On`, gives the date and time at which the account was closed, and the key legend ends with `F12=Active`. **F12** starts each list at page 1 without a search. The list is read-only: the selection field is protected, and the instruction line reads `Closed accounts are read-only.` The search field works as on the list of active accounts.

Clearing a Login Lockout

After 3 consecutive failed logons, a user name is locked out for 5 minutes; after 15 failed logons from one IP address, that address is locked out for 30 minutes. The counters are kept in storage only and are cleared when 3270BBS is restarted. An administrator clears a lockout at once with the TSO command `RESET LOCKOUT`, entered on the TSO command line (option `X` of the main menu):

Command	Effect
RESET LOCKOUT *username*	Clears the failure count and the lockout of the user name. The response is USER LOCKOUT CLEARED FOR *USERNAME*, or NO ACTIVE LOCKOUT FOUND FOR USER *USERNAME* if there was nothing to clear.
RESET LOCKOUT IP *address*	Clears the failure count and the lockout of the IP address. The response is IP LOCKOUT CLEARED FOR *address*, or NO ACTIVE LOCKOUT FOUND FOR IP *address*. The limits on password resets and registrations from the address are cleared as well.

Figure 4-12. The RESET LOCKOUT command

If a user who is not an administrator enters the command, the response is ERROR: ONLY ADMINISTRATORS CAN RESET LOCKOUTS. For example:

```
RESET LOCKOUT AKIM
USER LOCKOUT CLEARED FOR AKIM
RESET LOCKOUT IP 203.0.113.88
NO ACTIVE LOCKOUT FOUND FOR IP 203.0.113.88
READY
```

Figure 4-13. RESET LOCKOUT entered on the TSO command line

The failed logons themselves, with the IP address from which each came, are listed on the firewall administration screen (Chapter 6), from which an address may also be banned.

Chapter 5

Managing Content

This chapter describes topic, post, and conference management as an administrator sees them, and the means by which an administrator addresses all users at once. The screens are shared with moderators and are described in full in Chapter 9; this chapter gives only the points at which the administrator's authority is greater.

Topic Management

Option 7 of the main menu (`Admin Topics`) displays the Topic Management list.

```
                              Topic Management             Page 1/1
Search:
S  Title                                          Creator   Posts  Views Created
*******************************************************************************
   Buy cheap watches here                         dwilson   1      47     2Oct26
   Spam handling this week                        mlopez    1      31     1Oct26
   Scheduled maintenance on Sunday                admin     2      42    30Sep26
   PDP-11 front panel restoration                 tnguyen   2      84    29Sep26
   XEDIT prefix commands cheat sheet              mlopez    1      10    28Sep26
   REXX EXECs for daily backups                   jsmith    2      63    26Sep26
   How many channels does a 3880 need?            akim      2      26    24Sep26
   Restoring a 3278 keyboard                      bcooper   3      79    21Sep26
   Welcome to the General conference              admin     3      68     3Sep26









D=delete, E=edit, V=view topic. Topic Colors= G, R, Y, B, W

F1=Help F3=Menu F5=Refresh F7=Up F8=Down ENTER=Search/Process
```

Figure 5-1. The Topic Management list of an administrator (Model 2, 24 x 80; capture screens/adm-topics-list.txt)

The columns, selection codes, search field, and function keys are those described in “Topic Management (Option 7)” in Chapter 9. The administrator's version differs from the moderator's as follows:

- The list contains every topic of every conference. In Figure 5-1, the topics of `Announcements` (Admin Only) and `Moderators` (Moderator Only) appear with the others. A moderator sees only the topics of the conferences that the moderator may use, and receives `Access denied: topic is in a conference you cannot access` for any other.
- On the Edit Topic screen, the administrator may move a topic into any conference, and **`F5`** lists all conferences. A moderator's list holds only the accessible ones.

Caution
Deleting a topic deletes every post in it, including the posts of other users. Moving the topic, or deleting single posts, is usually the better course.

Post Management

Option `8` of the main menu (`Admin Posts`) displays the Post Management list, with the instruction line `D=delete E=edit V=view post T=view topic`. Its columns are the selection field, the post number (`ID`), the topic number (`Topic`, shown as *#n*), the beginning of the content, the author, and the date. The screen behaves identically for administrators and moderators: both see, and may delete or edit, every post, including posts in conferences that are marked `Admin Only`.

Conference Administration

`F10` on the conference list (option `1` of the main menu) displays the Conference Administration list. It lists every conference, with its description, the `A` (Admin Only) and `M` (Moderator Only) attributes, and the banned users.

```
                      Conference Administration            Page 1 of 1
  Total conferences: 6
S Conference Name             Description                    A M  Banned Users
*****************************************************************************
  Announcements               System news from the operator  Y N (none)
  General                     Default conference for gene... N N (none)
  Mainframe Hardware          Channels, DASD, tape and co... N N (none)
  Moderators                  Coordination among moderators  N Y (none)
  Retro Computing             Old iron of every kind         N N (none)
  VM and CMS                  Virtual machines, CMS, REXX... N N (none)



 F1=Help F3=Return  F5=CreateConf   F7=Prev  F8=Next  E=EditConf  D=DelConf
```

Figure 5-2. Conference Administration (Model 2, 24 x 80; capture screens/adm-confadmin-list.txt)

The selection codes are `E` (edit the conference) and `D` (delete it), and **`F5`** creates a new conference. These functions, and the list of banned users, are available to moderators as well. Deleting a conference asks for confirmation with **`F9`** and moves its topics to the conference `General`, which cannot be deleted or renamed.

```
                      Edit Conference

Conference Name: Announcements

Description (3 rows, max 239 chars):
System news from the operator



Admin Only (Y/N):  Y

Moderator Only (Y/N):  N

Banned Users (comma-separated, max 239 chars):









F3=Cancel  ENTER=Save Changes
```

Figure 5-3. Editing a conference (Model 2, 24 x 80; capture screens/adm-confadmin-edit.txt)

The only field of the Edit Conference and Create Conference screens that is reserved for administrators is `Admin Only (Y/N)`. For a moderator the field is protected, the words `(administrators only)` appear beside it, and its stored value is kept whatever else is changed. The attributes have the following effect:

Attribute	Effect
`Admin Only`	Only administrators may see or use the conference, its topics, and its posts. It suits discussion among the administrators; announcements to everyone belong in an ordinary conference.
`Moderator Only`	Only moderators and administrators may use the conference. It is suitable for coordination among the moderators.
`Banned Users`	A list of user names, separated by commas, of users who may not use the conference (at most 239 characters and 50 users). A ban applies to this conference only.

Figure 5-4. Conference attributes

Addressing All Users

3270BBS provides two means by which an administrator addresses every user: mail to all users, and the message of the day.

Mail to All Users

When composing a mail message, type `ALL` (or `*ALL*`) as the recipient. The message is delivered to the mailbox of every user. If any other user addresses a message to `ALL`, it is rejected with `Only administrators can send messages to all users`. When composing, an administrator sees the reminder `Administrator note: Enter *ALL* to send to all registered users`. Mail to all users should be used sparingly; a topic in an ordinary conference reaches the same readers without filling their mailboxes.

The Message of the Day

The message of the day is the line displayed near the bottom of the main menu and the extended menu. Its initial text is the `MOTD` setting in `tsu.cnf` (see Chapter 2). An administrator changes it, while 3270BBS runs, with the TSO command `MOTD`:

Command	Effect
`MOTD`	Displays the current message of the day on one line, `CURRENT MOTD: text`, and the syntax of the command on the next. A message too long for the line (only possible when it was set in `tsu.cnf`) is shortened, and ends with `...`.
`MOTD "text"`	Replaces the message of the day with *text*, at most 60 characters including the quotation marks. The response is `MESSAGE OF THE DAY UPDATED`; a longer text is rejected with `ERROR: MESSAGE OF THE DAY CANNOT EXCEED 60 CHARACTERS`.

Figure 5-5. The MOTD command

The text is stored exactly as it is typed, including the quotation marks. The change is kept in storage only: `tsu.cnf` is not changed, and the next start of 3270BBS restores the configured message. To make a change permanent, also change `MOTD` in `tsu.cnf`. A user who is not an administrator receives `ERROR: ONLY ADMINISTRATORS CAN CHANGE THE MESSAGE OF THE DAY`.

Other Content Privileges

Function	Administrator's privilege
`Community data sets`	On the data set list (`DSLIST`), BASIC and assembler data sets whose names begin `COMMUNITY.` are shared by all users. Only an administrator may edit (`E`) or delete (`D`) them; other users receive `Community datasets can only be changed by an administrator`.
`Marketplace`	An administrator may edit (`E`) the listing of any user; the listing keeps its original owner. Deleting a listing (`D`) remains reserved to its owner, for administrators as for other users.
`E-mail limits`	The daily limit on outbound Internet mail (`max_emails_per_day` in `tsu.cnf`) does not apply to administrators, and their messages are not counted against it. This includes topics, mail, notes, and held output sent as PDF documents with **`F20`** or the `O` action, and mail sent from BASIC and assembler programs. The ban on outbound mail for newly registered accounts does not apply to administrators either.
`Chat topic, one-liners, newsgroups`	Shared with moderators: `/topic` in chat, **`F12`** to edit or delete any one-liner, and the management of newsgroups. See Chapter 9.
`@ai in chat`	Reserved to administrators: `/ai` switches the `@ai` chat participant on and off, for everybody or for single users. See “Controlling the @ai Chat Participant”.

Figure 5-6. Other privileges of an administrator over content

Controlling the @ai Chat Participant

When an OpenAI key has been validated at startup (see “News and AI Assistance” in Chapter 2), users may ask the AI-bot a question in local chat and in private chat rooms by starting a line with `@ai`. An administrator may switch this participant off for everybody, or for single users, while the system runs. Every command is typed on the chat input line of local chat or of a private chat room and sent with **ENTER**. The command is never posted as a message: no other user sees it, and its result is displayed only to the administrator, on the message line below the input line. The commands may be typed in upper or lower case.

Command	Function	Message displayed
`/ai off`	Switches `@ai` off for every user, in local chat, private chat and SSH chat.	`@ai disabled for all users`
`/ai on`	Switches `@ai` on again.	`@ai enabled for all users`
`/ai status`	Shows whether `@ai` is on, and lists the users for whom it is blocked. `/chat status` does the same.	`@ai status: enabled, blocked: bob1`
`/ai off` *`user`*	Blocks `@ai` for one user. `/ai off for` *`user`* is accepted as well.	`@ai blocked for bob1`
`/ai on` *`user`*	Lifts the block for one user. The user is not told.	`@ai unblocked for bob1`

Figure 5-7. Administrator commands for @ai in chat

The heading of the chat screen shows the current state to every user, in white: `@ai enabled` or `@ai disabled`. It changes on every chat screen within a second of the command. When no OpenAI key was validated at startup, the heading shows neither, and `/ai on` and `/ai off` answer `@ai unavailable: no validated OpenAI API key`.

```
real-time      Local Chat                    @ai disabled 10:21:30
Online: admin, bob1 ‡ ‡ ‡
```

Each change is written to the system log, with the name of the administrator. In the `LOG` display the lines read, for example:

```
2026277 04:55:40 @ai off by admin
2026277 04:55:45 @ai blocked for bob1 by admin
2026277 04:55:55 @ai unblocked for bob1 by admin
2026277 04:56:10 @ai on by admin
```

A command that does not change anything, such as `/ai off` when `@ai` is already off, is not logged.

Chapter 6

System Activity and Service Control

This chapter describes the displays and commands with which an administrator observes and controls the running system: the SDSF activity display and its operator commands, the online users display, the login history, held output, the system log, firewall administration, the SMTP performance monitor, and the operator commands of the MVS console. The performance monitors that every user may display (DELTAMON, DBMON, and the per-user processor display) are described in the *3270BBS Terminal User's Guide* and, for their interpretation, in Chapter 10.

The SDSF Activity Display

To display system activity, select option `S` from the main menu, or enter `SD` at either menu.

```
ACTIVITY    TCB 25  MEM 20.7MB  CPU 19.00%  TX/H 7.3K  MAX   4
COMMAND ===>                                        00:01:22  since IPL
S USER     ACTIVITY     CPU% LAST ACT    LOGON-ST   P-S  TO SC  LOG  TERM
  admin    SDSF          0.0 -3 sec      15:30:36     2   2  1   21 2-310
  jsmith   NOTES         0.0 -43 sec     20:27:53     2   1  1    3 2-310
  mlopez   MAIL          0.0 -50 sec     17:27:53     3   2  1    3 2-310
  rpatel   CHAT          0.0 -57 sec     19:57:53     2   0  1    4 2-310
  FTPD     FTP SRV       0.0             STARTED      0   0  0
  TN3270D  NET SRV       0.0 -8 sec      STARTED      4   1  4
  TN3270TS TLS SRV       0.0             STOPPED      0   0  4
  HTTPD    WEB SRV       0.0             STARTED      0   0  0
  PROX3270 PRX SRV       0.0             STOPPED      0   0  0
  SSHD     SSH SRV       0.0             STARTED      0   0  0
  FINGERD  FIN SRV       0.0             STARTED      0   0  0
  SMTPD    MXE SRV       0.0             STOPPED      0   0  0
  WEB3270  W3E SRV       0.0             STOPPED      0
  *MASTER*               0.1 -1 sec      STARTED
  PCAUTH   PCAUTH        0.1 -1 sec      STARTED
  GRS      GRS           0.1 -1 sec      STARTED
  CONSOLE  CONSOLE       0.1 -1 sec      STARTED
  CATALOG  IEFPROC       0.1 -1 sec      STARTED


F1=Help F2=Logins F3=Ret F4=Online F6=Auto F8=Log F10=DMON F11=TLMTR F12=FW
```

Figure 6-1. The SDSF activity display of an administrator (Model 2, 24 x 80; capture screens/adm-sdsf.txt)

The display is the same for every user; its heading and columns are described in the *3270BBS Terminal User's Guide*. For an administrator it differs in three respects: the `COMMAND ===>` line accepts operator commands, more function keys are active, and on a Model 4 a horizontal meter of total processor use, labelled `All CPUs%`, is shown near the bottom of the screen. The key legend of an administrator reads `F1=Help F2=Logins F3=Ret F4=Online F6=Auto F8=Log F10=DMON F11=TLMTR F12=FW`.

Key	Function
F1	Displays and removes the help window, which explains the heading and the counters of the service rows.
F2	Displays the login history. (For other users, **F2** displays held output; an administrator reaches held output with the command HELD.)
F3	Returns to the main menu.
F4	Displays the online users.
F5, ENTER	Refresh the display (**ENTER** also processes a command).
F6	Turns automatic refresh on and off.
F8	Displays the system log.
F10	Displays DELTAMON.
F11	Displays the telemetry display.
F12	Displays firewall administration.

Figure 6-2. Function keys of the SDSF display for an administrator

Operator Commands

Type a command on the COMMAND ===> line and press **ENTER**. Commands may be typed in either case. The result is shown on the message line above the key legend.

```
ACTIVITY    TCB 26  MEM 22.7MB  CPU 19.00%  TX/H 10.3K  MAX   4
COMMAND ===>                                          00:02:47  since IPL
S USER     ACTIVITY     CPU% LAST ACT    LOGON-ST   P-S  TO SC  LOG  TERM
  admin    SDSF          0.0 -2 sec      15:33:23     2   2  1   23 2-310
  jsmith   NOTES         0.0 -2m:08s     20:27:53     2   1  1    3 2-310
  mlopez   MAIL          0.0 -2m:15s     17:27:53     3   2  1    3 2-310
  rpatel   CHAT          0.0 -2m:21s     19:57:53     2   0  1    4 2-310
  FTPD     FTP SRV       0.0             STARTED      0   0  0
  TN3270D  NET SRV       0.0 -22 sec     STARTED      6   1  4
  TN3270TS TLS SRV       0.0             STOPPED      0   0  4
  HTTPD    WEB SRV       0.0             STARTED      0   0  0
  PROX3270 PRX SRV       0.0             STOPPED      0   0  0
  SSHD     SSH SRV       0.0             STARTED      0   0  0
  FINGERD  FIN SRV       0.0             STARTED      0   0  0
  SMTPD    MXE SRV       0.0             STOPPED      0   0  0
  WEB3270  W3E SRV       0.0             STOPPED      0
  *MASTER*               0.1 -1 sec      STARTED
  PCAUTH   PCAUTH        0.1 -1 sec      STARTED
  GRS      GRS           0.1 -1 sec      STARTED
  CONSOLE  CONSOLE       0.1 -1 sec      STARTED
  CATALOG  IEFPROC       0.1 -1 sec      STARTED

Finger server started
F1=Help F2=Logins F3=Ret F4=Online F6=Auto F8=Log F10=DMON F11=TLMTR F12=FW
```

Figure 6-3. SDSF after the command S FINGERD (Model 2, 24 x 80; capture screens/adm-sdsf-start.txt)

Command	Effect
`S` *`service`*	Starts the service.
`P` *`service`*	Stops (pauses) the service.
`C U=`*`user`* `CANCEL U=`*`user`*	Disconnects the TN3270 session of the user. The responses are `User` *`user`* `disconnected successfully`, `User` *`user`* `not currently connected`, and `User` *`user`* `not found`. SSH sessions are not affected.
`LOG`	Displays the system log.
`FIREWALL`	Displays firewall administration.
`SMTPMON`	Displays the SMTP performance monitor.
`HELD`	Displays the administrator's own held output. `H`, `HE`, and `HEL` are accepted.
`HELD *` `HELD` *`user`*	Displays the held output of all users, or of one user.
`$PJES2,TERM`	Shuts 3270BBS down. The message `System shutdown initiated. Terminating in 2 seconds...` is displayed; after two seconds every session is ended, the log is closed, and the program ends.
`$PJES2,REIPL`	Restarts 3270BBS. The message `System REIPL initiated. Restarting in 2 seconds...` is displayed and the program ends with return code 42, which the script `start_bbs.bash` takes as a request to start the program again. Under any other supervisor, the effect depends on how that supervisor treats return code 42.

Figure 6-4. Operator commands on the SDSF display

The service names are those shown in the `USER` column of the service rows. The following table gives the response of each `S` and `P` command.

Service	Response to S	Response to P
FTPD	(none)	(none)
TN3270D	(none)	(none)
TN3270TS	TN3270TS server starting	TN3270TS server stopped
HTTPD	HTTPD server started	HTTPD server paused
PROX3270	PROX3270 server started	PROX3270 server paused
SSHD	SSH server started	SSH server paused
FINGERD	Finger server started Finger server failed to start	Finger server paused
SMTPD	SMTP server starting - see LOG for the result	SMTP server paused
WEB3270	WEB3270 terminal client started	WEB3270 terminal client paused

Figure 6-5. Responses to the S and P commands

The responses to `S HTTPD`, `S PROX3270`, `S SSHD`, and `S WEB3270` are displayed whether or not the server could be started; whether it is running is shown by the `LOGON-ST` column of the service row, which reads `STARTED` or `STOPPED`. A failure to start the SMTP server is reported in the system log. `S SSHD` starts the SSH server even if `tsu.cnf` does not enable it. Any other input from an administrator is cleared without a message.

If a user who is not an administrator types an operator command (any command beginning `S` , `P` , `C U=`, `CANCEL U=`, or `$`, and `LOG`, `FIREWALL`, `SMTPMON`, `HELD *`, or `HELD` *`user`*), the response is `Admins only`.

Caution

`P TN3270D` refuses every new logon on the TN3270 port, including the administrator's, and every new web3270 logon. Users already logged on continue, but nobody can log on through that port until the service is started again, from a session already logged on or by restarting 3270BBS. `$PJES2,TERM` asks for no confirmation; it ends every session two seconds after it is entered. `start_bbs.bash` then stops, because the program ended with return code 0, but a systemd unit with `Restart=always` starts the program again.

Online Users

`F4` on the SDSF display shows the users who are connected and those who disconnected within the last 24 hours. It is available only to administrators; any other user who reaches it is returned with `Access denied - admin only`.

```
ONLINE USERS   CONNECTED: 4  RECENT: 4  TOTAL: 4       TIME: 15:32:48
COMMAND INPUT ===>
USER     CONN-TIME   LAST-ACT    TLS 7D 1M  PST CHT    IP-ADDRESS
rpatel   1m:02s      0 sec       N        4    2    1  203.0.113.12
mlopez   56 sec      0 sec       N        3    3    1  192.0.2.57
jsmith   49 sec      0 sec       N        3    2    0  192.0.2.31
admin    10 sec      0 sec       N    2  21    2    0  198.51.100.7



F3=Return  F6=Auto-Refresh
```

Figure 6-6. The online users display (Model 2, 24 x 80; capture screens/adm-online-users.txt)

The heading gives the number of users connected (`CONNECTED`), the number of users listed, connected or active in the last 24 hours (`RECENT`), the number of users considered (`TOTAL`), and the time. Connected users are listed first, in white; recently disconnected users follow, in blue. A `!` after a user name indicates a TLS session, and `@` an SSH session.

Column	Meaning
USER	The user name.
CONN-TIME	For a connected user, how long the user has been connected; for a disconnected user, how long ago the user disconnected.
LAST-ACT	The time since the user's last action.
TLS	Y if the session is encrypted, otherwise N.
7D, 1M	The number of logons in the last 7 days and in the last 30 days.
PST	The number of posts the user has written.
CHT	The number of chat lines the user has written.
IP-ADDRESS	The IP address from which the user is connected.

Figure 6-7. Columns of the online users display

F3 returns to SDSF, **F5** and **ENTER** refresh the display, and **F6** turns automatic refresh on and off, at the monitor refresh rate of the administrator's profile. The COMMAND INPUT ===> field accepts no commands.

Login History

F2 on the SDSF display shows the logons of all users, newest first. The history is kept in storage, up to the latest 2000 logons, and starts empty when 3270BBS is restarted.

```
LOGIN HISTORY  4 logins       SORT LOGIN *Desc            1-4 of 4
SCROLL ===>  HALF        F11=Sort on column at cursor
USERNAME    SOURCE IP       TERM LOGIN         LOGOUT        DURATION
admin       198.51.100.7    Mod2 15:32 30ct26  active        8 sec
jsmith      192.0.2.31      Mod2 15:31 30ct26  active        47 sec
mlopez      192.0.2.57      Mod2 15:31 30ct26  active        54 sec
rpatel      203.0.113.12    Mod2 15:31 30ct26  active        1m:00s



F3=Return  F5=Refresh  F7=Up  F8=Down  F11=Sort
```

Figure 6-8. The login history (Model 2, 24 x 80; capture screens/adm-login-history.txt)

The heading gives the number of logons, the sort column and its direction, and the lines shown. The columns are the user name (`USERNAME`), the IP address from which the user connected (`SOURCE IP`), the terminal model (`TERM`), the times of logon and logoff (`LOGIN`, `LOGOUT`, which reads `active` for a session still connected), and the length of the session (`DURATION`). Times are shown in the administrator's time zone. **`F11`** sorts the list on the column under the cursor; **`F7`** and **`F8`** scroll by the amount in the `SCROLL ===>` field; **`F5`** refreshes, and **`F3`** returns to SDSF.

Held Output of All Users

The command `HELD *` on the SDSF display shows the held output of every user, and `HELD` *`user`* that of one user. The command `HELD` alone shows the administrator's own held output. Each of these views also lists the system logs of earlier runs of 3270BBS (job name `SYSLOG`, type `STC`, destination `SYS`), which other users never see. The log of the current run is not listed; it is displayed with `LOG`.

```
 SDSF HELD OUTPUT DISPLAY ALL CLASSES        0 LINES LINE 1-0 (0)
 COMMAND INPUT ===>                                   SCROLL ===> HALF
NP JOBNAME  TYPE JNUM  DN CRDATE  C FORM FCB  DEST    RC      TOT-REC RNUM



 F3=Return  F7=Up  F8=Down  S=Select  P=Purge  O=Email
```

Figure 6-9. Held output of all users (HELD *), with nothing held (Model 2, 24 x 80; capture screens/adm-held-all.txt)

The line actions are those of the user's display: `S` (display), `P` (purge), and `O` (send as a PDF document by mail). An administrator may perform them on the output of any user and on the system logs; other users receive `Admins only action`. On this display, the command `HELD` *`user`* or `HELD *` changes the view, `LOG` displays the system log, and `DA` returns to SDSF.

The System Log

The system log is displayed by the command `LOG` at either menu, on the SDSF display, or on the held output display, or by **`F8`** on the SDSF display. It contains the messages of the current run of 3270BBS: logons and logoffs, services starting and stopping, operator commands and their results, and errors. Only the latest 1000 entries are kept for the display; the log file on the host holds them all.

```
SYSTEM LOG DISPLAY  20:32:53       PAGE 1 OF 3         ENTRIES 29-46 (46)
COMMAND ===>
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+
2026276 20:31:23 TSU HTTPD STARTING ON PORT 24310
2026276 20:31:23 READY FOR CONNECTIONS - PRESS CTRL-C TO SHUT DOWN
2026276 20:31:23 HTTPS SERVER NOT STARTED - NO TLS CERTIFICATE CONFIGURED
2026276 20:31:45 AUTH: BCRYPT UPGRADE USER_ID=8 RPATEL
2026276 20:31:45 TSU  24301  $HASP100 RPATEL   ON TSOINRDR
2026276 20:31:45 TSU  24301  $HASP373 RPATEL   STARTED
2026276 20:31:45 TSU  24301  IEF125I RPATEL   - LOGGED ON - TIME=15.31.45
2026276 20:31:51 AUTH: BCRYPT UPGRADE USER_ID=6 MLOPEZ
2026276 20:31:51 TSU  24301  $HASP100 MLOPEZ   ON TSOINRDR
2026276 20:31:51 TSU  24301  $HASP373 MLOPEZ   STARTED
2026276 20:31:51 TSU  24301  IEF125I MLOPEZ   - LOGGED ON - TIME=15.31.51
2026276 20:31:58 AUTH: BCRYPT UPGRADE USER_ID=5 JSMITH
2026276 20:31:58 TSU  24301  $HASP100 JSMITH   ON TSOINRDR
2026276 20:31:58 TSU  24301  $HASP373 JSMITH   STARTED
2026276 20:31:58 TSU  24301  IEF125I JSMITH   - LOGGED ON - TIME=15.31.58
2026276 20:32:37 TSU  24301  $HASP100 ADMIN    ON TSOINRDR
2026276 20:32:37 TSU  24301  $HASP373 ADMIN    STARTED
2026276 20:32:37 TSU  24301  IEF125I ADMIN    - LOGGED ON - TIME=15.32.37
----+----1----+----2----+----3----END OF LOG+----5----+----6----+----7----+
F2=SEARCH  F3=RETURN  F5=REFRESH  F6=AUTO-REFRESH  F7=PREVIOUS  F8=NEXT
```

Figure 6-10. The system log (Model 2, 24 x 80; capture screens/adm-log.txt)

The heading gives the time, the page, and the entries shown. Each entry begins with the year and day of the year, and the time (`2026276 20:31:45`). The end of the log is marked by a ruler containing `END OF LOG`. The display shows 18 entries on a Model 2, 27 on a Model 3, and 37 on a Model 4.

Key or command	Function
F2	Searches toward older entries for the text typed on the COMMAND ===> line, without regard to case. **F2** with the line empty finds the next occurrence. The matching line is highlighted and the command line shows SEARCHING: *text* MATCH *n* OF *m*, where *n* is the position of the entry counted from the newest and *m* the number of entries.
F3	Returns to SDSF, from whichever screen the log was displayed.
F5	Refreshes the display.
F6	Turns automatic refresh on and off. The display then shows the newest entries every 5 seconds. **F5** keeps it on and **F2** is ignored; any other key or command turns it off.
F7, F8	Display the previous and the next page.
TOP, BOTTOM	Display the oldest and the newest entries.
UP, DOWN	Scroll by half a page; UP *n* and DOWN *n* scroll by *n* lines.
RETURN, EXIT	Return to SDSF.

Figure 6-11. Keys and commands of the system log display

The messages of the search are Please enter a search term, No matches found for: *text*, and Search wrapped to bottom. The log is also written to a file on the host (see Log Files in Chapter 10); the copies of earlier runs are listed in held output as described above.

Firewall Administration

Firewall administration is displayed by **F12** on the SDSF display, or by the command FIREWALL on the SDSF display or at either menu. It lists recent failed and successful logons by IP address, and bans addresses from every service of 3270BBS.

```
                            Firewall Administration              Update: 3 min
 SMTP:0   TN3270:5    TLS3270:0    SSH:0   FTP:0   HTTP:0
                     *Desc
AI   IP Address      Time     Reason                     Cnt Type     Drop
     203.0.113.88    15:32:05 Auth failed (akim)           1 TN3270   N



  Failed: 1     Successful: 4     Banned: 0         Page 1 of 1   FAILED

F1=Help F3=Return F4=Sort F7=Prev F8=Next F9=Banned F10=Failed F11=Success
```

Figure 6-12. Firewall administration: failed logons (Model 2, 24 x 80; capture screens/adm-firewall.txt)

The second line shows the number of connections open to SMTP, TN3270, TLS3270, SSH, FTP, and HTTP. The list shows failed events (`FAILED`, the default) or successful logons (`SUCCESSFUL`), as indicated at the right of the status line. The events are kept in storage only, up to the latest 2000, and are lost when 3270BBS is restarted. The display refreshes itself every 3 minutes.

Column	Meaning
`AI`	The action field, in which a ban code is typed.
`IP Address`	The address from which the connection came.
`Time`	The time of the event, in the administrator's time zone.
`Reason`	(Failed view) Why the attempt failed, for example `Auth failed (`*`user`*`)`. Connections refused because the address is banned read `Dropped by Firewall`.
`Username`	(Successful view) The user who logged on.
`Cnt`	The number of events from the same address.
`Type`	The service: `TN3270`, `TN3270TS`, `SSH`, `FTP`, `SMTPD`, `FINGER`, `WEB3270`, and so on.
`Drop`	(Failed view) `Y` if the connection was dropped.

Figure 6-13. Columns of firewall administration

```
                            Firewall Administration              Update: 3 min
 SMTP:0   TN3270:5    TLS3270:0    SSH:0   FTP:0   HTTP:0
                     *Desc
AI   IP Address      Time     Username      Cnt Type
     198.51.100.7    15:32:37 admin           1 TN3270
     192.0.2.31      15:31:58 jsmith          1 TN3270
     192.0.2.57      15:31:51 mlopez          1 TN3270
     203.0.113.12    15:31:45 rpatel          1 TN3270



  Failed: 1     Successful: 4     Banned: 0         Page 1 of 1   SUCCESSFUL

F1=Help F3=Return F4=Sort F7=Prev F8=Next F9=Banned F10=Failed F11=Success
```

Figure 6-14. Firewall administration: successful logons (F11) (Model 2, 24 x 80; capture screens/adm-firewall-success.txt)

Banning an Address

Type a code in the `AI` field of one or more lines and press **`ENTER`**.

Code	Effect
`BA, BP`	Bans the address permanently. The ban is written to the file `tsu.banned.ip` in the working directory, and is loaded again when 3270BBS starts. The response is `Permanently banned` *`n`* `IP(s).`
`BT`	Bans the address temporarily, until 3270BBS is restarted. The response is `Temporarily banned` *`n`* `IP(s).` A permanent ban is never reduced to a temporary one.

Figure 6-15. Ban codes

A banned address is refused by every service: TN3270 and TN3270 over TLS, SSH, FTP, SMTP, finger, the web3270 client, and every HTTP and HTTPS request (which receives `403 Forbidden`). Each refusal, except that of an HTTP or HTTPS request, is recorded as a failed event with the reason `Dropped by Firewall`. The following addresses cannot be banned, and the attempt is answered with the message shown:

Message	Explanation
`Cannot ban your own IP` *`ip`*	The address is the one from which the administrator is connected.
`Cannot ban local address` *`ip`* `(web3270/local access)`	The address belongs to the host itself; web3270 sessions arrive from it.
`Cannot ban invalid address` *`ip`*	The entry is not a valid IP address.
`ip` `is already permanently banned` *`ip`* `is already temporarily banned`	The address is already banned. (`BA` on a temporarily banned address makes the ban permanent.)
`ip` `stays permanently banned; BT ignored`	`BT` was typed for a permanently banned address.
`n` `row(s) changed by auto-refresh; retype selector`	The list was refreshed while codes were being typed.

Figure 6-16. Messages when banning an address

`F9` displays the window `Banned IP Addresses`, which lists each banned address with its type and the time at which it was banned. To remove a ban, type `UB` beside the address and press **`ENTER`**; the response is `Unbanned` *`n`* `IP(s)`, and the address is also removed from `tsu.banned.ip`. **`F7`** and **`F8`** page through the window, and any other key closes it.

Key	Function
F1	Displays and removes help.
F3	Returns to SDSF.
F4	Sorts on the column under the cursor; pressed again on the same column, reverses the order.
F7, F8	Display the previous and the next page.
F9	Displays the banned addresses.
F10	Displays failed events.
F11	Displays successful logons.
ENTER	Performs the ban codes typed.

Figure 6-17. Function keys of firewall administration

The file `tsu.banned.ip` may also be edited while 3270BBS is stopped: one address per line, with `#` introducing a comment. Address ranges (CIDR notation) are not supported; such lines are skipped with a warning when the file is loaded.

The SMTP Performance Monitor

The command `SMTPMON` (at either menu or on the SDSF display), or **`F12`** on the per-user processor display, shows the activity of the SMTP server that receives mail from the Internet. Other users who type `SMTPMON` receive `Access denied. Admin privileges required.` (at a menu) or `Admins only` (on SDSF); from the per-user processor display they are sent to DELTAMON.

```
SMTP Performance Monitor              Status: STOPPED         Open: 0
In 12h:      0      OK:          0      Fail:        0      Degraded:  0
DgThrot:     0      DgRate:      0      AvgDg:       0m     RejUsers:  0
ForcClose:   0      IdleDrop:    0      IPBlock:     0      FWDrop:    0
Top Sender IPs             Top Rejected IPs          Top Spamhaus IPs



Top Recipients             Top Outgoing               Top Rej Users



F1=Help F3=Return F7=Up F8=Down F9=Slower F10=Faster
```

Figure 6-18. The SMTP performance monitor (Model 2, 24 x 80; capture screens/adm-smtpmon.txt)

The heading shows the state of the server (`Status:`, in red when it is degraded or stopped) and the number of open connections. The counters below it give the messages received in the last 12 hours, the totals accepted and failed, the number of times the server entered its degraded (self-protecting) mode and why, and the numbers of rejected recipients, forced closes, idle connections dropped, blocked addresses, and connections dropped by the firewall. On a Model 2 the labels are abbreviated. The tables list the three most frequent sending, rejected, and Spamhaus-listed addresses, recipients, outgoing users, and rejected users; below them a log of recent events shows the time, address, action, and detail of each. **`F7`** and **`F8`** scroll the log, **`F9`** and **`F10`** slow and speed the refresh in steps of 0.5 seconds between 1 and 5 seconds (the initial rate is that of the profile), **`F1`** displays help, and **`F3`** returns to the screen from which the monitor was displayed.

Operator Commands on the MVS Console

The MVS console (option `O` of the extended menu, or the command `CONSOLE`) is described in the *3270BBS Terminal User's Guide*. Its display commands are available to every user; in addition, an administrator may start and stop services and shut the system down from it. The command `D SVC` (or `DISPLAY SVC`) shows all nine services, each with its state (`RUN` or `STOP`) and its number of live connections, as in Figure 6-19.

```
- TSUSRVI TSU  24301  $HASP373 ADMIN    STARTED
- TSUSRVI TSU  24301  IEF125I ADMIN    - LOGGED ON - TIME=15.39.03
-           P FTPD
- FTPDSRVI FTP SERVER STOPPED
- FTPDSRVI TSU FTPD STOPPED ON PORT 24312
- FTPDSRVI TSU CONSOLE IEE163I FTPD SERVER STOPPED
-           S FTPD
- FTPDSRVI TSU FTPD STARTING ON PORT 24312
- FTPDSRVI TSU CONSOLE IEE163I FTPD SERVER STARTED
- FTPDSRVI FTP SERVER LISTENING ON PORT 24312
- FTPDSRVI FTP UPLOAD LIMIT: 40 KB
-           D SVC
IEE104I 15.39.11 26.276 SERVICES     FRAME LAST         F      E     1A
 SVC      STATE  CONN    SVC      STATE  CONN    SVC      STATE  CONN
 FTPD     RUN   00000    TN3270D  RUN   00005    TN3270TS STOP  00000
 HTTPD    RUN   00000    PROX3270 STOP  00000    SSHD     RUN   00000
 FINGERD  RUN   00000    SMTPD    STOP  00000    WEB3270  STOP  00000



IEE152I     ENTER     CANCEL     D C,K


IEE163I MODE= RD
```

Figure 6-19. The MVS console after P FTPD, S FTPD, and D SVC (Model 2, 24 x 80; capture screens/adm-console-svc.txt)

`D A,L` shows the running services as started tasks, and the connected users as TSO users.

```
- TSUSRVI TSU  24301  IEF125I ADMIN    - LOGGED ON - TIME=15.39.03
-           P FTPD
- FTPDSRVI FTP SERVER STOPPED
- FTPDSRVI TSU FTPD STOPPED ON PORT 24312
- FTPDSRVI TSU CONSOLE IEE163I FTPD SERVER STOPPED
-           S FTPD
- FTPDSRVI TSU FTPD STARTING ON PORT 24312
- FTPDSRVI TSU CONSOLE IEE163I FTPD SERVER STARTED
- FTPDSRVI FTP SERVER LISTENING ON PORT 24312
- FTPDSRVI FTP UPLOAD LIMIT: 40 KB
-           D SVC
-           D A,L
IEE104I 15.39.13 26.276 ACTIVITY     FRAME LAST         F      E     1A
JOBS     M/S    TS USERS    SYSAS    INITS   ACTIVE/MAX VTAM   OAS
00000    00005    00004      00000    00000    00000/00000       00000
FTPD     FTPD     IEFPROC  NSW  S     TN3270D  TN3270D  IEFPROC  NSW  S
HTTPD    HTTPD    IEFPROC  NSW  S     SSHD     SSHD     IEFPROC  NSW  S
FINGERD  FINGERD  IEFPROC  NSW  S
ADMIN        OWT  3270               JSMITH       OWT  3270
MLOPEZ       OWT  3270               RPATEL       OWT  3270
 IEE152I     ENTER     CANCEL     D C,K


IEE163I MODE= RD
```

Figure 6-20. The MVS console after D A,L (Model 2, 24 x 80; capture screens/adm-console-dal.txt)

A display that does not fit in the command area is divided into frames. The first line of a display shows `FRAME` *n* while more frames follow, and `FRAME LAST` on the last; a display without such a line ends every frame but the last with `FRAME` *n* `OF` *m* `– K D,F FOR NEXT FRAME`. `K D,F` displays the next frame (after the last, the first again), and `K D,U` runs the display again with current figures. A display is not refreshed by itself: its figures are those of the moment the command was entered. Every display is also written in full to the system log.

The commands reserved for administrators are the following. From any other user they are rejected with `IEE305I` *command* `COMMAND INVALID`.

Command	Effect
`S` *service* `START` *service*	Starts the service. The console writes `IEE163I` *service* `SERVER STARTED`.
`P` *service* `STOP` *service*	Stops the service. The console writes `IEE163I` *service* `SERVER STOPPED`.
`$PJES2,TERM`	Writes the shutdown messages of the job entry subsystem to the log and, after two seconds, shuts 3270BBS down in the same manner as the command on the SDSF display.

Figure 6-21. Administrator commands on the MVS console

On the console, *service* is one of `FTPD`, `HTTPD`, `PROX3270`, `TN3270D`, and `TN3270TS`. Any other name is answered with `IEE163I INVALID SERVICE:` *name*; the other services (`SSHD`, `FINGERD`, `SMTPD`, `WEB3270`) are started and stopped from the SDSF display. `$PJES2,REIPL` is accepted only on the SDSF display.

Chapter 7

Database Maintenance

This chapter describes the DB Maint screen, from which an administrator reports on the database, removes old data, and runs the maintenance operations of the database manager. The screen works with both SQLite3 and PostgreSQL; where the two differ, this chapter says so. For a discussion of database growth and of backups, see Chapter 10.

The DB Maint Screen

To display the screen, select option `D` from the main menu. The screen is available only to administrators.

```
                            TSU - Database Maintenance        DB: SQLite3 (WAL)
Option ===>
******************************************************************************
Database:             tsu.db            Size:                 188.0 KB
Journal:              wal               Sync:                 FULL
Cache:                2000 KB           Busy timeout:         10000 ms
WAL autocheckpoint:   1000 pages        Integrity:            OK 15:31
Activity rows:        105               Mail rows:            3
******************************************************************************
 1 Trim Activity          Prune oldest N% of activity rows
 2 Trim Mail              Delete mail dated before a date
 3 Trim Chat              Delete chat messages before a date
 4 Trim One-Liners        Delete wall messages before a date
 5 Trim Marketplace       Delete listings before a date

 6 Purge Orphans          Remove rows for deleted users

 7 Analyze                Refresh planner stats
 8 Re-index               Recreate all indices
 9 Vacuum                 Reclaim freed space
10 Integrity Check        Verify pages/indices (read-only)


F3=Main Menu
```

Figure 7-1. The DB Maint screen (SQLite3) (Model 2, 24 x 80; capture screens/adm-dbmaint.txt)

The title line shows the database in use: `DB: SQLite3`, `DB: SQLite3 (WAL)` when the journal mode is WAL, or `DB: PostgreSQL` *`version`*. Below the `Option ===>` field, a block of statistics describes the database. The statistics are collected again each time the screen is displayed; the screen does not refresh itself. A figure that cannot be obtained is shown as `-` or `?`.

Field	Meaning (SQLite3)
`Database`	The database file, normally `tsu.db`.
`Size`	The size of the database file.
`Journal`	The journal mode. `wal` is recommended for production.
`Sync`	The synchronous setting: `OFF`, `NORMAL`, `FULL`, or `EXTRA`.
`Cache`	The page cache size.
`Busy timeout`	How long a connection waits for a lock, in milliseconds.
`WAL autocheckpoint`	(WAL mode) The number of pages after which the write-ahead log is checkpointed. In any other journal mode the field is replaced by `Note: non-WAL (use WAL)`.
`Integrity`	The result of the last integrity check: `OK` *`hh:mm`*, `FAILED` *`n hh:mm`* (in red, with the number of problems reported), `not run`, or `check error` (the check could not run). The time is when the check finished, at startup or by option 10.
`Activity rows`	The number of rows in the activity table, which records logons and other actions.
`Mail rows`	The number of mail messages.

Figure 7-2. Statistics on the DB Maint screen for SQLite3

With PostgreSQL the block has seven lines: the database name and size; the server version and the time since the server started (`Uptime`); the number of connections to the database and the cache hit ratio; the server address (or `local socket`) and the database user; the activity and mail rows; and the numbers of commits, rollbacks, inserts, updates, deletes, and rows fetched since the server's statistics were last reset. There is no `Integrity` field for PostgreSQL.

The Options

Option	Name	Operation
1	Trim Activity	Deletes the oldest *N* percent (1 to 99) of the activity rows. Rows of the last 8 days are always kept, because SDSF uses them.
2	Trim Mail	Deletes all mail dated before a given date.
3	Trim Chat	Deletes all chat lines dated before a given date.
4	Trim One-Liners	Deletes all one-liners dated before a given date.
5	Trim Marketplace	Deletes all marketplace listings dated before a given date.
6	Purge Orphans	Deletes mail, chat lines, and marketplace listings that belong to users who no longer exist in the database. Mail is deleted only when neither the sender nor the recipient exists.
7	Analyze	Runs `ANALYZE`, which refreshes the statistics used to plan queries.
8	Re-index	Runs `REINDEX`, which rebuilds every index.
9	Vacuum	Runs `VACUUM`, which returns freed space.
10	Integrity Check	(SQLite3) Runs `PRAGMA integrity_check`, which verifies the pages and indexes of the database without changing it.
10	Vacuum Full	(PostgreSQL) Runs `VACUUM (FULL, ANALYZE)`, which rewrites every table.

Figure 7-3. Options of the DB Maint screen

Any other entry is rejected with `Invalid option. Choose 1–10.` A blank entry redisplays the screen with fresh statistics. The only function key is **F3**: with a window open it closes the window, and otherwise it returns to the main menu.

Running an Option

Options 1 through 5 first display a window that asks for the percentage or the date. Type the value and press **ENTER**.

```
                            TSU - Database Maintenance        DB: SQLite3 (WAL)
Option ===>
*******************************************************************************
Database:             tsu.db            Size:                 188.0 KB
Journal:              wal               Sync:                 FULL
Cache:                2000 KB           Busy timeout:         10000 ms
WAL auto
Activity  | Trim Mail Table                                          |
********  |                                                          |********
 1 Trim   | Delete mail older than (YYYY-MM-DD):                     |
 2 Trim   |                                                          |
 3 Trim   |                                                          |
 4 Trim   |                                                          |
 5 Trim   | All mail dated before this date is removed. F3 cancels.  |

 6 Purge Orphans          Remove rows for deleted users

 7 Analyze                Refresh planner stats
 8 Re-index               Recreate all indices
 9 Vacuum                 Reclaim freed space
10 Integrity Check        Verify pages/indices (read-only)


F3=Main Menu
```

Figure 7-4. Option 2: the date is requested (Model 2, 24 x 80; capture screens/adm-dbmaint-input.txt)

A date is typed in the form `YYYY-MM-DD`; rows dated before midnight at the start of that day are selected. A value in the wrong form is answered, in the window, with `Enter an integer between 1 and 99.` or `Use YYYY-MM-DD (e.g. 2024-01-31).`

Every option then displays a confirmation window that states what will be done and, for options 1 through 6, how many rows will be deleted.

```
                          TSU - Database Maintenance        DB: SQLite3 (WAL)
Option ===>
*******************************************************************************
Database:             tsu.db            Size:                 188.0 KB
Journal:              wal               Sync:                 FULL
Cache:                2000 KB           Busy timeout:         10000 ms
WAL autoch                                                                  3
Activity r  Confirm Mail Trim
**********                                                                  *********
 1 Trim Ac  Will delete 3 mail messages dated before 2026-10-04.
 2 Trim Ma
 3 Trim Ch  Type Y and Enter to execute:
 4 Trim On
 5 Trim Ma  Anything other than Y cancels. F3 also cancels.

 6 Purge Orphans          Remove rows for deleted users

 7 Analyze                Refresh planner stats
 8 Re-index               Recreate all indices
 9 Vacuum                 Reclaim freed space
10 Integrity Check        Verify pages/indices (read-only)


F3=Main Menu
```

Figure 7-5. Option 2: confirmation (Model 2, 24 x 80; capture screens/adm-dbmaint-confirm.txt)

Type `Y` (or `YES`) and press **`ENTER`** to perform the operation. Anything else, or **`F3`**, cancels it, and the screen displays `Cancelled.` When the operation is complete, a window reports the result; any key closes it.

```
                          TSU - Database Maintenance        DB: SQLite3 (WAL)
Option ===>
*******************************************************************************
Database:             tsu.db            Size:                 188.0 KB
Journal:              wal               Sync:                 FULL
Cache:                2000 KB           Busy timeout:         10000 ms
WAL autoch                                                                  3
Activity r  Integrity Check Complete
**********                                                                  *********
 1 Trim Ac  No problems found. Pages and indices are consistent.
 2 Trim Ma
 3 Trim Ch
 4 Trim On
 5 Trim Ma  Press Enter to return.

 6 Purge Orphans          Remove rows for deleted users

 7 Analyze                Refresh planner stats
 8 Re-index               Recreate all indices
 9 Vacuum                 Reclaim freed space
10 Integrity Check        Verify pages/indices (read-only)


F3=Main Menu
```

Figure 7-6. Option 10: the result of an integrity check (Model 2, 24 x 80; capture screens/adm-dbmaint-integrity.txt)

After options 1 through 6 have deleted any rows, `VACUUM` is run automatically, and the result window says `VACUUM completed.` If nothing was deleted, it says `Nothing deleted — skipped VACUUM.` (options 1 through 5) or `No orphans found — skipped VACUUM.` (option 6). With PostgreSQL, options 7 through 10 report how many tables were skipped because the database user does not own them, for example `ANALYZE done, 2 tables skipped (not owner).`

If the integrity check finds damage, the result window says `CORRUPTION DETECTED — n problem row(s) reported.` and `FAILED — see the BBS log for the full report.`, and the full report is written to the system log. 3270BBS does not repair a damaged database, because SQLite has no means of repair. The operator's remedies, beginning with a backup taken with `sqlite3 tsu.db ".backup file"`, are described under The Integrity Check at Startup in Chapter 10.

Caution

Options 1 through 6 delete data permanently, for all users; there is no means of restoring it except from a backup. Take a backup before trimming. Option 8 (`REINDEX`) locks each table while its indexes are rebuilt, and the PostgreSQL option 10 (`VACUUM FULL`) takes an exclusive lock that blocks all other users until it is finished; the confirmation windows of both carry a warning. Run them when few users are logged on. Options 7, 9, and the SQLite3 integrity check may be run at any time.

Chapter 8

The Operator Console

This chapter describes the interfaces available to the system operator outside the 3270 screens: the Console View that 3270BBS displays on the terminal from which it was started, the ways in which the program is stopped, and the administration pages of the web interface.

The Console View

When 3270BBS is started from an interactive terminal (that is, when its standard input is a terminal), it replaces the ordinary scrolling log with a framed display, the Console View. The frame is drawn to the full size of the terminal, at least 80 columns by 20 rows. The following example was taken from a terminal of 80 columns by 24 rows.

```
                         3270BBS BBS — Console View
2026/10/03 15:38:05 No OpenAI API key found                                ▲
2026/10/03 15:38:05 Starting FTPD server on port 24312...
2026/10/03 15:38:05 Starting HTTPD server on port 24310...
2026/10/03 15:38:05 Starting SSHD server on port 24314...
2026/10/03 15:38:05 Starting FINGERD server on port 24313...
2026/10/03 15:38:05 TN3270TS server stopped on port 24311
2026/10/03 15:38:05 TLS server not started (disabled in configuration)
2026/10/03 15:38:05 Starting TN3270 server on port 24301...
2026/10/03 15:38:05 3270BBS
2026/10/03 15:38:05 Ready for connections - Press Ctrl-C to shut down
2026/10/03 15:38:05 Finger daemon listening on port 24313
2026/10/03 15:38:05 FTP server listening on port 24312
2026/10/03 15:38:05 FTP upload limit: 40 KB
2026/10/03 15:38:05 Starting HTTP server on port 24310
2026/10/03 15:38:05 HTTPS server not started - no TLS certificate configured
2026/10/03 15:39:07 FTP server stopped
2026/10/03 15:39:09 FTP server listening on port 24312
2026/10/03 15:39:09 FTP upload limit: 40 KB
v4.2.8.9  Up: 1m   Msgs: 29   ↑↓/PgUp/PgDn: Scroll        Ctrl+C: Shut down
```

Figure 8-1. The Console View on the operator's terminal, after P FTPD and S FTPD

The title line contains the `bbs_name` of `tsu.cnf`. The body shows the most recent log messages; a message longer than the frame is truncated. The bottom line shows the version of the program, the time since it was started (`Up:`), and the number of messages held (`Msgs:`, at most 10,000). While the view is scrolled back, the scroll hint `↑↓/PgUp/PgDn: Scroll` gives way to the position `[Line n/m]`, so that the line keeps within the frame. An arrow at the right edge of the body indicates that older (▲) or newer (▼) messages exist outside the frame.

The Console View accepts no commands. It is controlled by the following keys:

Key	Function
`Up arrow, Down arrow`	Scroll back and forward by one message. While the view is scrolled back, the bottom line shows `[Line n/m]` and new messages do not move the view.
`PgUp, PgDn`	Scroll back and forward by one frame. Scrolling forward to the end returns to following the newest messages.
`Ctrl+C`	Ends 3270BBS: the system log is closed and the terminal restored; see the next section.

Figure 8-2. Keys of the Console View

When standard input is not a terminal (for example, when 3270BBS is started by systemd or with its input redirected), the Console View is not used, and the log messages are written to standard output and standard error line by line, so that they may be collected by the supervisor or redirected to a file. Whatever the mode, the same messages are written to the system log, which an administrator displays with `LOG` (Chapter 6).

Operator commands are entered from a 3270 session, not from the Console View: on the SDSF display (Chapter 6) or on the MVS console. The administration functions of the TSO command line, such as `RESET LOCKOUT` and `MOTD`, are likewise entered from a 3270 session.

Stopping 3270BBS

Means	Effect
`$PJES2,TERM`	Entered by an administrator on the SDSF display or the MVS console. After two seconds, every session is ended, the system log is flushed and closed, and the program ends with return code 0. This is the preferred means.
`$PJES2,REIPL`	Entered on the SDSF display. As `$PJES2,TERM`, but the program ends with return code 42, which `start_bbs.bash` takes as a request to start it again.
`Ctrl+C in the Console View`	Writes `Console View: Ctrl+C – shutting down` to the system log, closes the system log, restores the terminal, and ends the program at once with return code 0. Unlike `$PJES2,TERM`, it does not wait two seconds for the sessions. In the Console View the terminal does not generate an interrupt signal; the key is read by 3270BBS itself.
`SIGINT, SIGTERM, SIGHUP`	When 3270BBS runs without the Console View, a signal from the operating system (for example from `kill` or `systemctl stop`) closes the system log, restores the terminal, and ends the program with return code 0.

Figure 8-3. Means of stopping 3270BBS

Note
`start_bbs.bash` starts the program again only after `$PJES2,REIPL` (return code 42) or when it ends with any return code other than 0, such as after a failure; after the other means in the table it stops as well. Ctrl+C in the terminal where the script runs also stops the script. A systemd unit with `Restart=always` starts 3270BBS again after any of these means; to stop the system for maintenance there, stop the unit.

`start_bbs.bash` starts the newest release binary in its own directory for the operating system and processor it runs on, so a binary downloaded from the releases page of the project is placed next to the script without being renamed (for example `3270BBS-4.2.9.2-linux-amd64`). Versions are compared number by number, so 4.2.10 is newer than 4.2.9.2. The binary is chosen again each time the program is restarted: to upgrade, put the new release binary, unchanged, next to `start_bbs.bash` and enter `$PJES2,REIPL`. If you copy it over the network, copy it to another directory first and then move it in with `mv`, so that a restart never finds a partly copied file. A binary without execute permission, as a browser saves it, is given it with a warning.

On its first run, `start_bbs.bash` fetches the license of 3270BBS from GitHub, shows its name, and asks `Accept the license? [y/N/v=view]`; **`v`** shows the full text. Nothing is downloaded or started until it is accepted. The acceptance is recorded in the file `.3270bbs_license_accepted` next to the script, and the question is not asked again. A first run without a terminal, for example from systemd, needs the option `–accept–license`.

If the directory holds no binary yet, the script offers to download the newest release binary for the operating system and processor from the releases page of the project. Run in a terminal, it shows the name, version and size of the file and asks `Download it now? [y/N]`; only **`y`** or **`yes`** downloads it. Run without a terminal, for example from systemd or `cron`, it never downloads on its own: run `./start_bbs.bash` once in a terminal, or start it as `./start_bbs.bash –download`, which downloads without asking. Every download is checked against the SHA-256 digest that GitHub publishes; if it does not match, the file is deleted and nothing is started.

With the option `–verify`, the script computes the SHA-256 digest of the binary before every start and compares it with the digest that GitHub publishes for a file of exactly that name (the digest is fetched once per file name). If they differ, if the file is not published, or if the releases page cannot be read, the binary is not started. When that happens after a REIPL onto a newer binary, the script starts the binary it verified earlier instead and writes a warning; otherwise it ends with return code 1.

Administration Pages of the Web Interface

When the web interface is started (`start_HTTPD=yes`; see Chapter 2), it contains the following pages for administrators. A visitor who is not logged on is sent to the logon page, and a logged-on user who is not an administrator receives `Unauthorized: Admin access required`.

Page	Function
`/admin/system`	Shows the state of the services HTTPD, FTPD, TN3270D, TN3270TS, and PROX3270; the users active in the last three hours, with their numbers of posts, topics, and logons; and the processor use, storage, goroutines, activity per hour, and time since startup. For each service, `Last Activity` is the time since its last connection or request (– if it has had none since startup); `Connected` is the number of connections open now, the same figure as `D SVC` on the MVS console; `Success` and `Failures` count the logons of TN3270D and TN3270TS, the FTP logons recorded in `ftp.log`, and the successful connections of PROX3270. A counter that does not exist (both for HTTPD, failures for PROX3270) is shown as –. Each service has buttons to start and stop it; the page then shows *`SERVICE`* `server started` or *`SERVICE`* `server stopped`, and the request is recorded in the activity table of the database as `ADMIN_SYSTEM_CONTROL`. A request for an unknown service or action shows `Invalid server or action`, does nothing, and is not recorded.
`/admin/topics`	Lists the topics, and displays, edits, deletes, and creates them. Unlike the 3270 Topic Management, these pages are not open to moderators.

Figure 8-4. Administration pages of the web interface

The web interface can start and stop only the five services named above; the others are controlled from the SDSF display.

Chapter 9

Moderator Functions

This chapter describes the functions that 3270BBS provides for moderators: how a user becomes a moderator, which screens and keys are added for a moderator, how far the authority of a moderator extends, and how each moderator function is used. The rest of the *3270BBS Terminal User's Guide* applies to a moderator in the same way as to any other user.

The screens shown in this chapter were captured on a display station Model 2 (24 lines of 80 columns) while logged on as the moderator `jbrooks`. On a Model 3 or a Model 4 the lists hold more lines; the instruction, message, and function key lines move to the bottom of the larger screen, and nothing else changes.

Becoming a Moderator

A moderator is a user whose account carries the *moderator* attribute. The attribute is granted and withdrawn by an administrator, and by no one else: on the user edit screen of option `6` (`Admin Users`), the administrator types `Y` or `N` in the field `Moderator (Y/N):` and presses **`ENTER`**. A moderator cannot grant the attribute to another user, and cannot remove it from himself or herself.

The attribute is read when the user logs on, and again whenever the user displays the wall of one-liners (option `L`). A user who is logged on when the attribute is changed otherwise receives, or loses, the moderator options at the next logon. An account may carry both the moderator and the administrator attribute; an administrator has every moderator function in any case.

The attribute is public. The `Mod` column of the user rolodex (option `U`) shows `Yes`, in yellow, for every moderator, so that any user can find out who the moderators are.

```
Total users: 9                User Rolodex                 Page 1/1
Search:
  Username  Mod Adm Topics  Posts  Online  Last Login  Country     About Me
********************************************** *Desc***************************
  jbrooks   Yes No  3       4      Online      3Oct26  USA
  bcooper   No  No  2       4      Offline     3Oct26  USA
  tnguyen   No  No  0       0      Offline     3Oct26  France
  mmartin   No  No  2       4      Offline     1Oct26  Germany
  akim      No  No  2       3      Offline    30Sep26  South Korea
  rpatel    No  No  2       3      Offline    29Sep26  Canada
  admin     No  Yes 0       0      Offline      Never  N/A
  noreply   No  No  0       0      Offline      Never  N/A
  smtp      No  No  0       0      Offline      Never  N/A









 F1=Help F3=Rtrn F5=About F7=Up F8=Down F10=Point&Msg F11=Point&Sort
```

Figure 9-1. The user rolodex, showing the moderator jbrooks (Model 2, 24 x 80; capture screens/mod-rolodex.txt)

The moderator functions are available on 3270 display stations only. The SSH interface offers none of them except `/topic` in chat (see "Setting the Chat Topic"), and the web interface offers none.

Summary of Moderator Functions

The following table lists every function that is added for a moderator and where it is invoked.

Function	Where it is invoked	Described in
`Mod Topics`	Option 7 on the main menu, or =7 on the extended menu	"Topic Management"
`Mod Posts`	Option 8 on the main menu, or =8 on the extended menu	"Post Management"
`Conference administration`	**`F10`** on the conference list (option 1)	"Conference Administration"
`New conference while starting a topic`	**`F5`** on the `Select Conference` screen of the topic-creation procedure	"Creating a Conference While Starting a Topic"
`Chat topic`	`/topic` in local chat, from a 3270 display station or from SSH	"Setting the Chat Topic"
`One-liner correction`	**`F12`** on the wall of one-liners (option L)	"Correcting the Wall of One-Liners"
`Newsgroup management`	The newsgroup screens, where newsgroups are enabled	"Newsgroups"
`Moderator-only conferences`	Conferences whose `Moderator Only` flag is set	"Creating and Editing a Conference"

Figure 9-2. Functions available to a moderator

The main menu of a moderator shows options `7 Mod Topics` and `8 Mod Posts` directly below `0 Edit Profile`. An administrator sees the same two options under the names `Admin Topics` and `Admin Posts`, together with options that a moderator does not have. A user who is neither a moderator nor an administrator and selects option 7 or 8 receives the message `Access denied. Admin or Moderator privileges required.` There are no typed commands reserved for moderators: the list displayed by the `COMMANDS` command is the same for a moderator as for any other user.

Scope of a Moderator's Authority

3270BBS has no per-conference moderators. The moderator attribute applies to the whole system, and any moderator may act in any conference that the functions below allow. The extent of each function differs, and is as follows:

Function	Extent
`Mod Topics`	Only topics in conferences that the moderator may read: not in an `Admin Only` conference, and not in a conference from which the moderator is banned. A topic may be moved only into such a conference.
`Mod Posts`	Every post on the system, in every conference. `D` and `E` act on any post listed; `V` and `T` display a post only if the moderator may read its conference.
`Conference administration`	Every conference, including `Admin Only` conferences. A moderator may edit the name, the description, the `Moderator Only` flag, and the banned users of any conference, and may delete any conference except `General`. Only the `Admin Only` flag is reserved for administrators.
`Chat topic, one-liners`	The whole system: there is one chat topic for local chat and one wall of one-liners.

Figure 9-3. Extent of each moderator function

Caution

The wider extent of Mod Posts and of conference administration is not shown on the screens. A moderator who works in a conference that he or she cannot read, or in an `Admin Only` conference, acts without seeing the context. The practice of the system is that a moderator leaves `Admin Only` conferences, and their posts, to the administrators.

Topic Management (Option 7)

To manage topics, select option `7` from the main menu, or enter `=7` on the extended menu. The `Topic Management` screen lists every topic that the moderator may manage, newest first.

```
                              Topic Management             Page 1/1
Search:
S  Title                                          Creator   Posts  Views Created
*******************************************************************************
   Anyone going to the user group meeting?    akim      3      12    30Sep26
   Moderator rota for October                 jbrooks   1      3     29Sep26
   CHEAP WATCHES - BEST PRICES!!!             tnguyen   1      4     28Sep26
   Terminal cable wiring question             rpatel    1      18    20Sep26
   BASIC program to list primes               mmartin   1      22    14Sep26
   Assembler: BALR vs BAS                     rpatel    2      27    12Sep26
   Best keyboard for 3270 emulation?          akim      2      39    10Sep26
   Show us your 3179G                         bcooper   2      51     6Sep26
   Colour tags in posts - a cheat sheet       mmartin   1      62     5Sep26
   How do virtual sessions work?              bcooper   3      73     3Sep26
   Forum rules - please read                  jbrooks   1      140    2Sep26
   Welcome to the General conference          jbrooks   2      88     1Sep26




D=delete, E=edit, V=view topic. Topic Colors= G, R, Y, B, W

F1=Help F3=Menu F5=Refresh F7=Up F8=Down ENTER=Search/Process
```

Figure 9-4. The Topic Management screen (Mod Topics) (Model 2, 24 x 80; capture screens/mod-topics.txt)

The columns are as follows:

Column	Meaning
`S`	The selector field, in which an action letter is typed.
`Title`	The title of the topic, shortened to 41 characters, displayed in the color assigned to the topic (white if none has been assigned).
`Creator`	The user who started the topic.
`Posts`	The number of posts in the topic, including the first post.
`Views`	The number of times the topic has been displayed.
`Created`	The date on which the topic was started.

Figure 9-5. Columns of the Topic Management screen

The conference of a topic is not shown in the list; it is shown on the edit screen (see "Editing and Moving a Topic"). The screen holds 17 topics on a Model 2, 25 on a Model 3, and 36 on a Model 4. The page number and the number of pages are shown at the right of the title line.

To find a topic by its title, type a word or part of a word in the `Search:` field and press **ENTER**. Only titles are searched, without regard to case. The title line then reads `Topics matching '`*`word`*`'` and the list starts again at page 1. To return to the full list, erase the field and press **ENTER**.

Actions on Topics

To act on a topic, type one of the following letters in its selector field and press **ENTER**. The instruction line reads `D=delete, E=edit, V=view topic. Topic Colors= G, R, Y, B, W`. Letters may be typed in upper or lower case.

Letter	Action
`D`	Deletes the topic, after confirmation. The topic, all its posts, the likes given to those posts, and the notification opt-outs for the topic are deleted. See "Deleting a Topic".
`E`	Edits the title, the conference, and the text of the first post. This is how a topic is moved to another conference. See "Editing and Moving a Topic".
`V`	Displays the topic as a reader sees it. **F3** on the topic returns to the Topic Management screen at the same page and with the same search.
`G R Y B W`	Displays the title in green, red, yellow, blue, or white. See "Coloring a Topic".

Figure 9-6. Action letters on the Topic Management screen

The following rules apply to the selector fields:

- Several topics may be marked with `D`, or with the same color letter, before **ENTER** is pressed. They are then processed together.
- `E` and `V` act on one topic at a time. If more than one topic is marked, the message `Please select only one topic to edit` or `Please select only one topic to view` is displayed.
- Different letters may not be mixed in one operation. If they are, the message `Please select only one operation type at a time` is displayed and nothing is done.
- Any other character is rejected before any topic is touched, with the message `Invalid selector 'X': use D, E, V, G, R, Y, B or W`. This prevents a stray mark from being included in a deletion.

The following function keys are valid on this screen:

Key	Function
ENTER	Performs the search, if the `Search:` field was changed; otherwise performs the actions marked in the selector fields. With nothing marked, the list is displayed again.
F1	Displays the general help screen. **F3** on the help screen returns to the list.
F3	Returns to the main menu.
F5	Displays the list again, at the same page and with the same search.
F7, F8	Displays the previous or the next page. At the first or the last page the key has no effect.
F23, F24	Displays the Virtual Sessions list, or switches to the next virtual session. The page and search are kept.

Figure 9-7. Function keys on the Topic Management screen

Coloring a Topic

A color letter changes the color in which the title is displayed, both on the Topic Management screen and in the topic list that every user sees in the conference. The color is retained until it is changed with another letter. The result is reported in green on the message line, for example `1 topic(s) set to green`.

```
                              Topic Management             Page 1/1
Search:
S  Title                                          Creator   Posts  Views Created
*******************************************************************************
   Anyone going to the user group meeting?    akim      3      12    30Sep26
   Moderator rota for October                 jbrooks   1      3     29Sep26
   CHEAP WATCHES - BEST PRICES!!!             tnguyen   1      4     28Sep26
   Terminal cable wiring question             rpatel    1      18    20Sep26
   BASIC program to list primes               mmartin   1      22    14Sep26
   Assembler: BALR vs BAS                     rpatel    2      27    12Sep26
   Best keyboard for 3270 emulation?          akim      2      39    10Sep26
   Show us your 3179G                         bcooper   2      51     6Sep26
   Colour tags in posts - a cheat sheet       mmartin   1      62     5Sep26
   How do virtual sessions work?              bcooper   3      73     3Sep26
   Forum rules - please read                  jbrooks   1      140    2Sep26
   Welcome to the General conference          jbrooks   2      88     1Sep26




D=delete, E=edit, V=view topic. Topic Colors= G, R, Y, B, W
1 topic(s) set to green
F1=Help F3=Menu F5=Refresh F7=Up F8=Down ENTER=Search/Process
```

Figure 9-8. A topic color has been set (Model 2, 24 x 80; capture screens/mod-topics-color.txt)

The color is a means of marking announcements and rules so that they are found quickly; it is effective only if it is used sparingly. The following points should be noted:

- In the conference topic list, a topic that has received posts since the reader last logged on is displayed in pink and underscored, whatever color has been assigned to it.
- There is no letter that removes a color. `W` sets white, which is also the color of a topic that has never been colored, and therefore has the same appearance.
- On a monochrome display station the color is not visible.

Editing and Moving a Topic

`E` on the Topic Management screen displays the `Edit Topic` screen for the topic.

```
                              Edit Topic

          Topic ID:      9

          Title:         Terminal cable wiring question

          Conference:    General

          Creator:       rpatel

          Created:       20 Sep 2026

          Posts:         1





          Press Enter to edit content, or F3 to cancel; changes save together

  F1=Help  F3=Cancel  F5=Select Conference  ENTER=Continue to Content
```

Figure 9-9. The Edit Topic screen (Model 2, 24 x 80; capture screens/mod-topic-edit.txt)

Field	Meaning
`Topic ID`	The number of the topic. It cannot be changed.
`Title`	The title of the topic. The field may be changed, and may not be left blank.
`Conference`	The conference to which the topic belongs. To move the topic, type the name of another conference, or press **F5** and choose one from a list. The field holds 18 characters, the longest conference name permitted.
`Creator, Created, Posts`	The author, the date of creation, and the number of posts. They cannot be changed.

Figure 9-10. Fields of the Edit Topic screen

When **ENTER** is pressed, the title and the conference are checked, and the first post of the topic is opened in the content editor under the heading `Edit Content for Topic:`. Nothing has yet been changed at this point. The title, the conference, and the text are written together when the text is saved in the editor (**F12** or the `SAVE` command). If the editor is left without saving (`CANCEL`, or **F3** followed by **F9**), the topic is left exactly as it was, including its title and conference. After a save, the Topic Management screen is displayed with the message `Topic updated`.

```
Edit Content for Topic: Terminal cable wiring question    Crsr: L1 | W9 L1 P1
Command:  _                    SAVE/CANCEL/FIND  F1=HELP!  F7=Up F8=Down
Which pins carry the coax shield on a balun?
```

Figure 9-11. The first post of a topic in the content editor (Model 2, 24 x 80; capture screens/mod-topic-editor.txt)

The editor is described in the *3270BBS Terminal User's Guide*. To move a topic without changing its text, press **ENTER** on the Edit Topic screen and then save the text unchanged.

F5 on the Edit Topic screen displays a window that lists the conferences into which the moderator may move the topic. An `Admin Only` conference, and a conference from which the moderator is banned, are not listed.

```
                              Edit Topic


          Topic ID:      9
               +-------------------------------------------------+
          Titl |               Select Conference                |
               |-------------------------------------------------|
          Conf |   3270BBS                                       |
               |   General                                       |
          Crea |   Hardware                                      |
               |   Moderators                                    |
          Crea |   Programming                                   |
               |                                                 |
          Post |                                                 |
               |                                                 |
               |                                                 |
               |                                                 |
               |                                                 |
               +-------------------------------------------------+


          Select a conference from the window above, or press F3 to cancel

  F3=Cancel  F7=Scroll Up  F8=Scroll Down  ENTER=Select
```

Figure 9-12. Choosing the conference for a topic (Model 2, 24 x 80; capture screens/mod-topic-selconf.txt)

Type any character in front of one conference and press **ENTER**. The Edit Topic screen is displayed again with that name in the `Conference` field; the title typed so far is kept. The window shows eleven conferences at a time: **F7** and **F8** scroll it by five, and a line below the window, such as `Showing 1–11 of 14 conferences`, appears when there are more. **F3** closes the window without a change.

The following function keys are valid on the Edit Topic screen: **ENTER** (continue to the content), **F1** (general help), **F3** (cancel and return to the list), **F5** (select a conference), **F23** and **F24** (virtual sessions; the values typed are kept).

The following messages may be displayed on the Edit Topic screen:

Message	Meaning
`Conference 'name' does not exist`	No conference has the name typed.
`Access denied: you cannot move a topic into that conference`	The conference is `Admin Only`, or the moderator is banned from it.
`Value for topicTitle is not valid`	The title is blank.
`Value for topicConference is not valid`	The conference name is blank or contains a character that is not permitted in a conference name.
`Please select only one conference at a time`	More than one conference was marked in the window.
`Please select a conference`	**`ENTER`** was pressed in the window with no conference marked.

Figure 9-13. Messages on the Edit Topic screen

Caution

A change that a moderator makes to the text of a post is not marked on the post. Readers see the changed text under the name of the original author, with no indication that it was edited, or by whom.

Deleting a Topic

`D` on the Topic Management screen displays the `Confirm Delete` screen, which lists the titles of the topics marked.

```
                              Confirm Delete



          Are you sure you want to delete 1 topic(s)?
          This will permanently delete all posts in these topics!

          Topics to delete:
            - CHEAP WATCHES - BEST PRICES!!!









          Press ENTER to confirm deletion, or F3 to cancel

  F3=Cancel  ENTER=Confirm Delete
```

Figure 9-14. Confirming the deletion of a topic (Model 2, 24 x 80; capture screens/mod-topic-delete.txt)

ENTER deletes the topics and returns to the list with the message `n topic(s) deleted`. **F3** returns to the list without deleting anything. A deleted topic cannot be recovered: its posts, including the replies of other users, are deleted with it.

The authority of the moderator is checked again when **ENTER** is pressed. If any of the topics is in a conference that the moderator may not manage, for example because the conference was made `Admin Only` in the meantime, none is deleted, and the message `Access denied: topic is in a conference you cannot access` is displayed. The same message is displayed for the other actions in the same case.

Post Management (Option 8)

To manage individual posts, select option `8` from the main menu, or enter `=8` on the extended menu. The `Post Management` screen lists every post on the system, newest first.

```
                              Post Management              Page 1/2
Search:
S ID     Topic Content                                      Author   Created
*****************************************************************************
  20     #12   I will be there on Saturday.                 bcooper   1Oct26
  19     #12   buy cheap watches at my shop                 tnguyen   1Oct26
  18     #12   It is in Chicago this year.                  akim     30Sep26
  17     #11   I will take the first two weeks of October.  jbrooks  29Sep26
  15     #9    Which pins carry the coax shield on a balun? rpatel   20Sep26
  14     #8    10 FOR I=2 TO 100 ... a short program.       mmartin  14Sep26
  13     #7    BAS is fine below the line; BASR for regis.. mmartin  12Sep26
  12     #7    When should I prefer BAS over BALR?          rpatel   12Sep26
  11     #6    A 122-key Model M, without question.         rpatel   11Sep26
  10     #6    Model M or something newer with PF keys?     akim     10Sep26
  9      #5    Nice. Mine needs a new keyboard cable.       akim      7Sep26
  8      #5    Mine still works after 35 years.             bcooper   6Sep26
  7      #4    Put <<red>> on its own line, then your text. mmartin   5Sep26
  6      #3    You can keep chat open in one and mail in .. mmartin   3Sep26
  5      #3    F24 opens the next virtual session. F23 li.. jbrooks   3Sep26
  4      #3    I pressed F24 and ended up at the main men.. bcooper   3Sep26
  3      #2    1. Be civil. 2. Post in the right conferen.. jbrooks   2Sep26
D=delete  E=edit  V=view post  T=view topic

F1=Help F3=Menu F5=Refresh F7=Up F8=Down ENTER=Search/Process
```

Figure 9-15. The Post Management screen (Mod Posts) (Model 2, 24 x 80; capture screens/mod-posts.txt)

Column	Meaning
`S`	The selector field.
`ID`	The number of the post.
`Topic`	The number of the topic to which the post belongs, preceded by #.
`Content`	The beginning of the text, shortened to 45 characters.
`Author`	The user who wrote the post.
`Created`	The date on which the post was written.

Figure 9-16. Columns of the Post Management screen

The list holds 17 posts on a Model 2, 25 on a Model 3, and 36 on a Model 4. The first post of each topic appears in the list in the same way as the replies.

To find posts by their text, type a word in the `Search:` field and press **ENTER**. The text of the posts is searched, without regard to case, and the title line reads `Posts matching '`*`word`*`'`, the word shortened to 11 characters. To return to the full list, erase the field and press **ENTER**. A search is the quickest way to find every copy of a message that has been posted in several topics.

```
                              Posts matching 'watches'      Page 1/1
Search: watches
S ID     Topic Content                                      Author   Created
*****************************************************************************
  19     #12   buy cheap watches at my shop                 tnguyen   10ct26 ************************************************************************* D=delete  E=edit  V=view post  T=view topic

F1=Help F3=Menu F5=Refresh F7=Up F8=Down ENTER=Search/Process
```

Figure 9-17. Searching the text of all posts (Model 2, 24 x 80; capture screens/mod-posts-search.txt)

Actions on Posts

The instruction line reads `D=delete E=edit V=view post T=view topic`.

Letter	Action
D	Deletes the post, after confirmation. Several posts may be marked.
E	Opens the post in the content editor under the heading `Edit Post #n in Topic:`. When the text is saved, the list is displayed with the message `Post updated`.
V	Displays the topic at the page that contains the post.
T	Displays the topic from its beginning.

Figure 9-18. Action letters on the Post Management screen

The rules for the selector fields are those of the Topic Management screen: `E`, `V`, and `T` act on one post at a time; letters may not be mixed; and any other character is rejected with the message `Invalid selector 'X': use D, E, V or T`. **`F3`** on a topic displayed with `V` or `T` returns to the Post Management screen at the same page and with the same search.

If the post belongs to a conference that the moderator may not read, `V` and `T` do not display it. The topic list is displayed instead, with the message `Topic not found or access denied: access denied: insufficient permissions for this topic`.

```
Edit Post #11 in Topic: Best keyboard for 3270 emulat...  Crsr: L1 | W6 L1 P1
Command:  _                    SAVE/CANCEL/FIND  F1=HELP!  F7=Up F8=Down
A 122-key Model M, without question.
```

Figure 9-19. A post opened for editing from Post Management (Model 2, 24 x 80; capture screens/mod-post-editor.txt)

The following function keys are valid on the Post Management screen: **`ENTER`** (search or process), **`F1`** (general help), **`F3`** (main menu), **`F5`** (display again), **`F7`** and **`F8`** (previous and next page), **`F23`** and **`F24`** (virtual sessions). At the first or the last page, **`F7`** or **`F8`** displays `Already on the first page` or `Already on the last page`.

Deleting a Post

`D` displays the `Confirm Delete` screen, which shows the beginning of each post marked (at most eight are listed; the rest are counted).

```
                              Confirm Delete



          Are you sure you want to delete 1 post(s)?

          Posto to delete:

            - buy cheap watches at my shop









          ENTER to confirm deletion F3 to cancel

  F3=Cancel  ENTER=Confirm Delete
```

Figure 9-20. Confirming the deletion of a post (Model 2, 24 x 80; capture screens/mod-post-delete.txt)

ENTER deletes the posts, together with the likes given to them, and returns to the list with the message `n post(s) deleted`. **F3** returns without deleting anything.

The first post of a topic cannot be deleted on this screen, because it is the text of the topic: deleting it would make the first reply the topic text, or leave a topic without posts. If a first post is among those marked, the confirmation screen is displayed again with the message shown in the following figure. To remove such a post, delete the whole topic with option `7`, or replace its text with `E`.

```
                              Confirm Delete



          Are you sure you want to delete 1 post(s)?

          Posts to delete:

            - Cannot delete the topic's first post; delete the topic instead
            - Which pins carry the coax shield on a balun?


Delete failed: this is the topic's first post; delete the topic instead
          ENTER to confirm deletion F3 to cancel

 F3=Cancel  ENTER=Confirm Delete
```

Figure 9-21. The first post of a topic cannot be deleted (Model 2, 24 x 80; capture screens/mod-post-delete-first.txt)

The posts are deleted one at a time in the order listed. If the deletion of one post fails, the posts before it in the list have already been deleted.

Conference Administration

Conferences are created, changed, and deleted through conference administration. To invoke it, select option `1` from the main menu and press **`F10`** on the conference list. The function key line of a moderator shows `F10=Admin` in white; other users do not have this key.

```
                       Available Conferences
  Total conferences: 5     Total topics: 11                 Page 1 of 1
S Conference Name        Topics Subscrd Latest Topic
****************************************** *Desc****************************
  General                2              Anyone going to the user group m...
  Moderators             1              Moderator rota for October
  Hardware               3              Terminal cable wiring question
  Programming            2              BASIC program to list primes
  3270BBS                3              Colour tags in posts - a cheat s...

F3=Return  F5=My Subscriptions  F7=Prev  F8=Next F10=Admin  F11=Point&Sort
```

Figure 9-22. The conference list as a moderator sees it (Model 2, 24 x 80; capture screens/mod-conferences.txt)

The conference list of a moderator includes the conferences whose `Moderator Only` flag is set, which other users do not see; in the figure, `Moderators` is such a conference. **`F10`** displays the `Conference Administration` screen.

```
                       Conference Administration            Page 1 of 1
  Total conferences: 6
S Conference Name             Description                    A M  Banned Users
******************************************************************************
  3270BBS                     Questions and news about th... N N (none)
  General                     Default conference for gene... N N (none)
  Hardware                    Terminals, controllers, key... N N tnguyen
  Moderators                  Coordination between modera... N Y (none)
  Programming                 BASIC, assembler, REXX and ... N N (none)
  Sysops                      System operators only          Y N (none)

F1=Help F3=Return  F5=CreateConf   F7=Prev  F8=Next  E=EditConf  D=DelConf
```

Figure 9-23. The Conference Administration screen (Model 2, 24 x 80; capture screens/mod-confadmin.txt)

The Conference Administration screen lists every conference on the system, in order of name, including those that the moderator cannot read. The columns are as follows:

Column	Meaning
`S`	The selector field.
`Conference Name`	The name of the conference.
`Description`	The beginning of the description, or `(no description)`.
`A`	`Y` if the conference is `Admin Only`, that is, visible to administrators only.
`M`	`Y` if the conference is `Moderator Only`, that is, visible to moderators and administrators only.
`Banned Users`	The users banned from the conference, shortened to 13 characters, or `(none)`.

Figure 9-24. Columns of the Conference Administration screen

To edit a conference, type `E` in its selector field and press **ENTER**, or place the cursor on its line and press **ENTER**. (Any character other than `D` selects the conference for editing.) To delete a conference, type `D`.

The following function keys are valid on this screen:

Key	Function
ENTER	Edits or deletes the conference marked, or edits the conference on whose line the cursor is placed. Closes the help window if it is displayed.
F1	Displays a help window on the list.
F3	Returns to the conference list.
F5	Creates a conference.
F7, F8	Displays the previous or the next page. The screen holds 17 conferences on a Model 2, 25 on a Model 3, and 36 on a Model 4.
F9	Confirms a deletion, while the deletion window is displayed.
F23, F24	Virtual sessions. A help or deletion window that is displayed is restored on return.

Figure 9-25. Function keys on the Conference Administration screen

```
                        Conference Administration            Page 1 of 1
  Total conferences
S Conference Name     Conference Administration - Help      A M  Banned Users
*******************                                         *******************
  3270BBS             Function Keys:                        . N N (none)
  General               F3  = Return to previous screen     . N N (none)
  Hardware              F5  = Create new conference         . N N tnguyen
  Moderators            F7  = Previous page                 . N Y (none)
  Programming           F8  = Next page                     . N N (none)
  Sysops                F9  = Confirm deletion                Y N (none)

                      Line Commands:
                        E   = Edit conference
                        D   = Delete conference
                              (type in selector column)

                        Press ENTER to close this help




 F1=Help F3=Return  F5=CreateConf   F7=Prev  F8=Next  E=EditConf  D=DelConf
```

Figure 9-26. The conference administration help window (Model 2, 24 x 80; capture screens/mod-confadmin-help.txt)

Creating and Editing a Conference

F5 displays the `Create Conference` screen with empty fields; `E` displays the `Edit Conference` screen with the values of the conference. The two screens have the same fields.

```
                      Edit Conference

Conference Name: Hardware

Description (3 rows, max 239 chars):
Terminals, controllers, keyboards and cables



Admin Only (Y/N):  N   (administrators only)

Moderator Only (Y/N):  N

Banned Users (comma-separated, max 239 chars):
tnguyen









F3=Cancel  ENTER=Save Changes
```

Figure 9-27. Editing a conference (Model 2, 24 x 80; capture screens/mod-confedit.txt)

Field	Meaning
`Conference Name`	Required. Up to 18 characters. Letters, digits, blanks, and the characters `_ . - $ & # ( ) " ' : { } | /` are permitted. No two conferences may have the same name, without regard to case. The conference `General` cannot be renamed.
`Description`	Optional; up to 239 characters on the three lines provided. It is shown on the conference list of the topic-creation procedure and on this screen.
`Admin Only (Y/N)`	Shows whether the conference is visible to administrators only. For a moderator the field is protected and marked `(administrators only)`; its value is kept as it is when the conference is saved, and is `N` for a conference that a moderator creates.
`Moderator Only (Y/N)`	`Y` makes the conference visible only to moderators and administrators. It is suitable for coordination among moderators. Blank is taken as `N`.
`Banned Users`	The user IDs banned from the conference, separated by commas; up to 239 characters, at most 50 users, and at most 20 characters for each user ID. See "Banning a User from a Conference".

Figure 9-28. Fields of the Create Conference and Edit Conference screens

ENTER checks and saves the conference and returns to the Conference Administration screen with the message `Conference 'name' created successfully` or `Conference 'name' updated successfully`. **F3** returns without saving. If a field is in error, the screen is displayed again with the values typed and one or more of the following messages, separated by semicolons:

Message	Meaning
`Conference name cannot be empty`	The name is blank.
`Conference name too long (max 18 characters)`	The name has more than 18 characters.
`Conference name contains invalid characters`	The name contains a character that is not permitted.
`A conference with this name already exists`	Another conference has this name.
`The General conference cannot be renamed`	An attempt was made to rename `General`.
`Description too long (max 239 characters)`	The description does not fit.
`Moderator Only must be Y or N`	Another value was typed in the flag.
`Username 'name' too long (max 20 chars)`	An entry in the banned list is too long.
`Banned users list too long (max 239 characters)`	The banned list does not fit.
`Error updating conference: too many banned users (max 50)`	More than 50 users are listed. When a conference is created, the message begins `Error creating conference`.

Figure 9-29. Messages on the Create Conference and Edit Conference screens

Banning a User from a Conference

To ban a user from a conference, edit the conference, add the user ID to the `Banned Users` field, separated from the others by a comma, and press **`ENTER`**. To lift the ban, remove the user ID and press **`ENTER`**. Blanks around the commas are ignored, and user IDs are compared without regard to case.

From the moment the conference is saved, a banned user does not see the conference in the conference list, its topics in any topic list or search, or its posts; the user cannot open a topic of the conference, even with a `bbs://` link, and therefore cannot reply in it or start a topic in it. The ban applies to that conference only. The user is not told of the ban.

The following points should be noted:

- The user IDs are not checked. A misspelled user ID is accepted and bans no one.
- A ban has no effect on an administrator.
- A ban does apply to a moderator, including the moderator who saved it, and overrides the `Moderator Only` flag. A banned moderator can no longer manage the topics of that conference with option `7`.
- There is no means, other than a ban in each conference, of silencing a user. A user cannot be banned from chat or from the wall of one-liners, and only an administrator can change or remove the account of another user.

Deleting a Conference

`D` in the selector field of a conference displays a confirmation window.

```
                       Conference Administration            Page 1 of 1
  Total conferences: 7
S Conference Name             Description                    A M  Banned Users
*****************************************************************************
  3270BBS                     Questions and news about th... N N (none)
  General                     Default conference for gene... N N (none)
  Hardware                    Terminals, controllers, key... N N tnguyen
  Moderators                  Coordination between modera... N Y (none)
  Programming                                                   (none)
  Retrocomput     Delete conference: Retrocomputing             (none)
  Sysops                                                        (none)
                  All topics will be reassigned to General.
                  Press F9 to confirm deletion.
                  Press any other key to cancel.
F1=Help F3=Return  F5=CreateConf   F7=Prev  F8=Next  E=EditConf  D=DelConf
```

Figure 9-30. Confirming the deletion of a conference (Model 2, 24 x 80; capture screens/mod-confdelete.txt)

`F9` deletes the conference; any other key closes the window and leaves the conference as it was. The topics of the deleted conference are not deleted: they are moved to the conference `General`, and the subscriptions to the deleted conference are removed. The message reads `Conference 'name' deleted. n topics moved to General`, or `Conference 'name' deleted successfully (no topics to move)`. The conference `General` itself cannot be deleted; the attempt is refused with the message `Cannot delete the General conference`.

Caution

The topics of a deleted conference become readable by every user who may read `General`, that is, by everyone. The deletion of an `Admin Only` or `Moderator Only` conference therefore publishes its topics. Before deleting such a conference, move or delete its topics.

Creating a Conference While Starting a Topic

A topic is normally started with **F5** from within the topic list of a conference, and belongs to that conference. When the topic is started from a topic list that is not limited to one conference, the topic-creation procedure asks for the conference on the `Select Conference` screen. For a moderator, the function key line of that screen shows `F3=Cancel F5=New Conference`.

F5 displays a window, `Create New Conference`, with a single field, `Conference Name:`. **ENTER** creates the conference, with no description, with both flags set to `N`, and with no banned users, and continues the creation of the topic in the new conference. **F3** returns to the `Select Conference` screen. The name is subject to the rules given above; the messages end with a period, and a name already in use is refused with `Conference already exists.` The description and the flags of the new conference may be set later through conference administration.

Setting the Chat Topic

A moderator may display a short text, the *chat topic*, in the heading of local chat. To set it, enter `/topic` followed by a blank and the text on the chat input line, and press **ENTER**. The command is not posted as a message. The text, of which only the first 20 characters are kept, appears in yellow reverse video in the heading of every user's chat screen, and the message `Chat topic updated` is displayed. The heading of a 3270 chat screen shows the first 18 of these characters; SSH chat shows all 20.

```
real–time      Local Chat Please be civil    @ai enabled  10:21:22
Online: admin, bob1















10:21 bob1     Hello all. Anyone tried the new Hardware conference?
10:21 admin    Yes, the 3179G thread is great.

admin    ====>
Chat topic updated
F1=Help F2=Spell F3=Out F4=Complete F5=About F7=Up F8=Dn F9=Recall F10=ScrnShot
```

Figure 9-31. Local chat with a chat topic set by a moderator (Model 2, 24 x 80; capture screens/mod-chat-topic.txt)

To remove the chat topic, enter `/topic` alone; the message `Chat topic cleared` is displayed. The command may be typed in upper or lower case. A user who is not a moderator or an administrator receives the message `Only admins/moderators can set the chat topic`.

Chat	Effect of `/topic`
`Local chat (3270)`	Sets the one chat topic of local chat, at most 20 characters. It is retained when the system is restarted.
`Local chat (SSH)`	The same chat topic as from a 3270 display station; the result is written on the SSH session.
`Federated chat`	In this release federated chat cannot be selected from the menus (the message is `Federated chat is disabled`). Where it is available, `/topic` sets a separate topic, at most 21 characters, which is displayed to the users of this system only and is lost when the system is restarted.
`Private chat rooms`	Has no chat topic.

Figure 9-32. Effect of /topic in each kind of chat

The chat topic is the only moderator function in chat. (Administrators can, in addition, control the `@ai` chat participant; see “Controlling the @ai Chat Participant”.) There is no means of removing a message from chat or a user from a chat room. If a word with a user is required, mail or a summons should be used.

Correcting the Wall of One-Liners

On the wall of one-liners (option `L`), a user may revise only the most recent one-liner, and only if it is the user's own (**`F9`**). A moderator has, in addition, **`F12`**, shown as `F12=Edit` on the function key line, which acts on any one-liner. Place the cursor on the line of the one-liner and press **`F12`**. The color window is displayed with the text and the color letter of the one-liner, and its instruction line reads `ENTER=Save F3=Cancel F9=Delete`.

```
 Wall of One-Liners                                          4 msgs
*****************************************************************************
 bcooper 29Sep2026 Green screens forever.
 ----------------------------------------------------------------------------
 mmartin 30Sep2026 Greetings from Boeblingen!
 ----------------------------------------------------------------------------
 tnguyen 01Oct2026 BUY CHEAP WATCHES NOW
  +-------------------------------------------------------------------------+-
  |  Choose a color for your message:                                       |
  |                                                                         |-
  |  Y  BUY CHEAP WATCHES NOW                                               |
  |                                                                         |
  |  B=Blue    T=Turq    G=Green     W=White     Y=Yellow      P=Pink       |
  |                                                                         |
  |  ENTER=Save  F3=Cancel  F9=Delete                                       |
  +-------------------------------------------------------------------------+




 jbrooks:

F3=Menu F5=AboutUser F7=Up F8=Down F9=Revise F12=Edit F22=Cpy/Paste ENTER=Post
```

Figure 9-33. A one-liner opened for correction with F12 (Model 2, 24 x 80; capture screens/mod-oneliner-edit.txt)

Key	Function
ENTER	Saves the text and the color letter (B T G W Y P; any other letter is taken as W). The author and the date are not changed. The text is limited to 60 characters.
F9	Deletes the one-liner at once. There is no confirmation.
F3	Closes the window without a change.

Figure 9-34. Keys in the one-liner correction window

If the cursor is not on the line of a one-liner when **F12** is pressed, the message `Position cursor on a one-liner row, then press F12` is displayed.

Newsgroups

Newsgroups are available only on a system that is connected to a newsgroup database (the `newsgroup_db_` settings of `tsu.cnf`). Where they are enabled, they are reached by entering `=G` at the main menu or the extended menu, or by following a `bbs://` link to a newsgroup; option `G` of the extended menu itself displays `Newsgroups is disabled` in this release. On the newsgroup screens a moderator has the same management functions as an administrator:

- on the list of newsgroups, **F5** creates a newsgroup, and the selector letters `E` and `D` edit and delete a newsgroup;
- on the list of subjects of a newsgroup, `E` and `D` edit and delete a subject;
- on the list of posts of a subject, `E` and `D` edit and delete a post.

Deletions are confirmed before they are performed. Other users who try these functions receive the message `Administrators and moderators only` or `Admin/Moderator only`. Newsgroups may be shared with other systems, so that a change made here may be seen by their users as well.

Moderation Practice

The functions described in this chapter are powerful, and most of them cannot be undone. The following practices are recommended:

- Prefer the smallest action that is effective: first a word to the author by mail, then moving a topic to the correct conference, then deleting a post, and only then a ban.
- State the action taken. A topic that disappears without explanation costs more goodwill than the post that caused its removal. When a post is removed, tell the author why, by mail.
- Do not change the words of another user. An edit made by a moderator is not marked, and the changed text appears under the author's name. Delete the post instead, or ask the author to correct it.
- Before deleting, look. Use `V` or `T` to read a post in its topic, and the `Search:` field of option `8` to find every copy of an unwanted message.
- Use topic colors for rules and announcements only, and few of them; a list in which every title is colored marks nothing.
- Leave `Admin Only` conferences, and the posts in them, to the administrators, although Mod Posts and conference administration do not prevent a moderator from acting on them.
- Move the topics out of a conference before deleting it, especially if it is `Admin Only` or `Moderator Only`.
- Agree among the moderators, for example in a `Moderator Only` conference, who looks after which conferences. The system does not divide the work; the moderators must.
- Write a `PUBLIC` note that identifies you as a moderator and names the conferences for which you are responsible. The rolodex shows your moderator attribute; the note tells users what to expect of you.

Chapter 10

Performance and Sizing

This chapter describes the resources that 3270BBS consumes, reports measurements of a test system under a known load, and recommends machine sizes for small, medium and large installations. It then describes the tuning and operating practices that keep a system within those sizes: the choice and care of the database, the growth of the database and of the log files, the integrity check at startup, backups, and the response to the thresholds of the performance monitors.

Throughout this chapter, a *concurrent user* is a user who is logged on at a given moment, and a *registered user* is an account in the `users` table, whether or not its owner is logged on. Unless stated otherwise, the figures refer to concurrent users.

What Consumes Resources

3270BBS is a single process. Every function of the system, including the network servers, runs inside that process, so that the storage and the processor time reported for the process are the cost of the whole system. The principal consumers are as follows:

Consumer	Description
`Connections`	Each TN3270 connection is served by its own goroutine (a lightweight thread of the Go run-time system), which runs the screens of that user from logon to logoff. Screens that update themselves, such as the menus, chat and the monitors, start one or two further goroutines while they are displayed. A user may hold only one TN3270 connection: a second logon with the same user ID closes the first connection.
`Session storage`	Each logged-on user carries the session state: the screen in use, the three virtual sessions with the saved state of each, the editor buffer and its undo record when a text is being edited, and the scroll position of lists. The three virtual sessions are kept within the one connection; they do not open further connections.
`Logon`	Each logon verifies the password with bcrypt at cost 10, and each logon takes at least 100 milliseconds by design. A legacy SHA-256 password is converted to bcrypt at its first logon. The processor cost is noticeable only when many users log on at the same time, for example after a restart.
`Self-updating screens`	The main menu updates its clock once a minute. After four minutes without input (the default of the user's profile, 1 to 30 minutes) the main menu starts the screen saver, which redraws the screen about nine times a second until a key is pressed. The optional stock ticker on the main menu redraws eight times a second while the market is open. Chat polls the display station every two seconds for the typing indicator unless `chat_typing_indicator=no` is specified.
`Chat`	A message posted on this instance is delivered at once to every chat user of the instance. In addition, a single background task reads the `chat` table every ten seconds to pick up messages written by another instance that shares the same PostgreSQL database, and after a restart.
`Metric collection`	A background task samples the metrics of the performance monitors every three seconds. On each sample it starts the commands `netstat -an` and, on Linux, a scan of `/proc` for the thread count; on macOS it also starts `ps -M -A`, `vm_stat` and `top`. These commands run as separate processes, so their cost appears on the host, not in the figures of the 3270BBS process.
`Processor profiler`	To attribute processor time to users, 3270BBS runs the Go processor profiler continuously in windows of one second. The profiler samples at 100 per second; its cost is a small, constant fraction of the processor time consumed.
`Database`	SQLite (the default) runs inside the process, with a pool of at most 25 connections, write-ahead logging (WAL) and a busy timeout of ten seconds. PostgreSQL runs as a separate server; 3270BBS opens at most 100 connections to it per instance. See Choosing and Tuning the Database.
`HTTP and web3270`	The web interface and the web-based 3270 client run in the same process. web3270 accepts at most 50 WebSocket sessions in total and five per client address; each session holds a TN3270 connection back to the system, so it costs a 3270 session plus the WebSocket.
`SSH`	Each SSH connection performs a key exchange and a signature with the 2048-bit RSA host key, which costs some milliseconds of processor time per connection. At most 64 SSH connections, logged-on sessions included, may be open at the same time, and at most ten connections per client address are accepted in ten minutes.
`FTP and PROX3270`	FTP uploads are limited by `FTP_limit` (in kilobytes). Each PROX3270 session to a remote host holds two 32-kilobyte buffers and copies every byte in both directions.
`BASIC and assembler`	A BASIC program may run for at most 15 seconds of active time and 55 million statements; an assembler program for at most 40 seconds and 40 million instructions. A running program can occupy one processor for that time. Several users running programs at the same time each occupy a processor.
`AI assistance`	When an OpenAI key is configured, spelling correction, IMPROVE, translation and the `@ai` chat participant send requests to OpenAI. The time of these requests is network waiting time, up to 45 seconds for an `@ai` answer; it costs almost no processor time and no storage beyond the texts involved.
`Database growth`	Chat lines, posts, mail, one-liners and the activity log grow without limit until they are trimmed. See Disk Growth.

Figure 10-1. Principal consumers of resources

Monitor Thresholds

The performance monitors (DELTAMON and the System Performance display, described in the *3270BBS Terminal User's Guide*) color each reading against two thresholds. The thresholds for the metrics of the 3270BBS process are the same on every operating system:

Metric	Measures	Warning	Critical
`CPU %`	Processor use of the whole host	55	75
`MEM MB`	Storage obtained by the 3270BBS process from the operating system, less the storage it has returned	95	130
`TCB`	Number of goroutines in the 3270BBS process	90	120
`GC ms`	Duration of the last garbage-collection pause	0.5	0.8
`Heap objects`	Number of allocated objects	130000	250000
`Connections`	Established TCP connections of the host	170	250

Figure 10-2. Thresholds of the performance monitors

The thresholds for interrupts, paging and threads of the host are set per operating system and are not repeated here. MEM in the SDSF heading and on the monitors is the figure of the Go run-time system; the resident set size reported by `ps` or `top` is larger, because it also contains the program itself and the storage of the SQLite library.

The thresholds are fixed values chosen for a small system. A larger installation that is sized according to this chapter shows TCB, and at the largest sizes also MEM, in pink or red under normal load; this is expected and is not by itself a sign of trouble. The thresholds cannot be changed in `tsu.cnf`.

Measured Resource Use

The figures in this section were measured on a test system set up for this purpose. They describe the cost of 3270BBS itself; the machine must also hold the operating system and, where used, PostgreSQL.

Method

Item	Value
`Host`	Apple M5 Pro, 18 processor cores, 48 GB of storage, internal solid-state disk, macOS 26.4. The host was not dedicated: other programs ran at the same time.
`Program`	3270BBS 4.2.8.9, built with Go 1.26.2 (darwin/arm64), started with a new SQLite database created by `create_tsudb.bash` and seeded with 155 test accounts, one conference, 8 topics and 200 posts. Only the TN3270 server was started; TLS, HTTP, web3270, SSH, FTP, SMTP, FINGER and PROXY3270 were not, and no OpenAI key was configured.
`Clients`	One `s3270` emulator (Model 2, 24 x 80) per session, on the same host, each logged on as a different test account.
`Idle`	All sessions at the main menu without input. Each idle window ended less than four minutes after the last input, so no screen saver was running.
`Active`	Each session repeatedly selected Conferences, Mail, One Liners and Chat from the main menu, returning with **`F3`** each time, posted one chat line on every visit to chat, and paused two seconds after each round: about 0.7 screens a second per session. This is a stress load; a person at a display station changes screen far less often.
`Readings`	Each reading covers 60 seconds. RSS is the resident set size of the process and CPU the processor time it consumed (from `ps`), as a percentage of one core. Go MEM and TCB were read from the SDSF heading by an additional administrator session logged on for the purpose, which is included in TCB. Screens/s is the number of screen changes made by all sessions.

Figure 10-3. Conditions of the measurements

Sessions	State	RSS MB	Go MEM MB	TCB	CPU %	Screens/s
0	—	38.5	20.4	14	0.50	0
1	Idle	42.0	20.6	16	0.55	0
1	Active	43.3	20.1	15	0.65	0.7
10	Idle	44.1	20.9	33	0.55	0
10	Active	48.7	24.6	29	2.25	6.8
25	Idle	49.3	22.6	63	0.63	0
25	Active	59.3	25.7	55	5.07	17.1
50	Idle	47.8	26.3	114	0.60	0
50	Active	77.0	27.9	76	13.6	34.2
100	Idle	77.5	33.3	213	0.77	0
100	Active	113.5	33.7	161	40.8	68.5
150	Idle	113.8	39.3	314	0.78	0
150	Active	142.9	39.9	248	104.2	102.5
250*	Idle	164	52	514	1.0	0
250*	Active	214	—	—	173 or more	171
500*	Idle	289	83	1014	1.4	0
500*	Active	389	—	—	346 or more	342
1000*	Idle	539	146	2014	2.4	0
1000*	Active	739	—	—	691 or more	683

Figure 10-4. Resource use by number of concurrent sessions

The rows for 0, 50, 100 and 150 sessions come from one run in which the sessions were added in those steps; the rows for 1, 10 and 25 sessions come from an earlier run on a freshly started system. The two runs agreed within a few megabytes and a few tenths of a percent where they overlapped.

* The rows marked with an asterisk are extrapolated, not measured. They are computed as the measured empty system plus the number of sessions times the measured cost of one session, the cost of one session being the difference between the 150-session row and the empty row divided by 150: 0.50 MB RSS, 0.126 MB Go MEM, 2.0 goroutines and 0.0019 percent CPU per idle session, and 0.70 MB RSS and 0.69 percent CPU per active session. Go MEM and TCB were not extrapolated for the active state, because their readings depend on the screen each session happens to be on. Under the stress load the processor time per screen change rose with the number of sessions (0.40, 0.60 and 1.02 percent per screen change a second at 50, 100 and 150 sessions), because every chat line is delivered to every user in chat; the extrapolated active CPU figures are therefore lower bounds for that load.

What the Measurements Show

- An empty system needs about 40 MB of real storage, of which the Go run-time system reports about 20 MB.
- Each logged-on user adds about 0.5 MB of real storage while idle and about 0.7 MB while active, and about two goroutines.
- Idle sessions cost almost no processor time: 150 idle sessions used less than 1 percent of one core.
- Processor time is driven by screen changes and chat. At 50 sessions a screen change cost about 4 milliseconds of processor time.
- Each logon cost about 58 milliseconds of processor time (50 logons in 2.9 seconds), almost all of it the bcrypt password check.

To translate the stress load to real users, assume that a user changes screen once every 15 to 30 seconds, that is, 0.03 to 0.07 screens a second, or one tenth to one twentieth of the test load. 500 real users then make 17 to 33 screen changes a second, about the rate of 25 to 50 stressed sessions, which used 5 to 14 percent of one core; the larger fan-out of chat to many users adds to this. The screen saver, which redraws about nine times a second for each idle user at the main menu, was not included in the measurement; it adds network traffic and processor time for every user who leaves a session at the main menu, and users can turn it off in their profile.

Sizing Recommendations

The recommendations below are for concurrent users. Registered accounts cost only disk space (a few hundred bytes each, plus the content their owners create). Where a figure for registered accounts is needed, it is assumed here that the peak number of concurrent users is 5 to 10 percent of the registered accounts; check this ratio against the MAX figure of the SDSF heading and the account count of an existing installation.

The storage figures apply the measured cost of 0.7 MB for each active user, add the 40 MB of the empty system, and double the result as a safety margin for garbage collection, editor buffers, file transfers and bursts of activity. The three virtual sessions of a user do not multiply this: they share one connection and one session, and only the saved state of each virtual session is added. web3270 users count as TN3270 users, because each web3270 session is a TN3270 session to the system itself.

Item	Small	Medium	Large
`Concurrent users`	Up to 50	Up to 500	More than 500
`Registered accounts (5–10% concurrent)`	Up to 500-1,000	Up to 5,000-10,000	More than 5,000-10,000
`3270BBS storage, estimated`	75 MB, 150 MB with margin	390 MB, 800 MB with margin	0.7 MB per user plus 40 MB, doubled, per instance
`Processor`	1 vCPU	2 vCPU; 4 if many users run BASIC or assembler programs	4 to 8 vCPU per instance
`Real storage (machine)`	1 GB	2 to 4 GB	8 GB or more per instance; the PostgreSQL server sized separately
`Disk`	20 GB SSD	40 GB SSD	100 GB or more of SSD (NVMe) for PostgreSQL; 20 GB per instance
`Database`	SQLite	SQLite on a local SSD; PostgreSQL if the database is to be on another machine	PostgreSQL, `max_connections` at least 100 per instance plus 20
`File descriptors (ulimit -n)`	1024 (default)	4096 or more	65536
`Network`	1 Mbit/s	10 Mbit/s	100 Mbit/s
`Operating system`	Linux is recommended: its processor figures are accurate, and `essential_scripts/add_service.bash` installs a systemd unit with `Restart=always`, `RestartSec=10` and `LimitNOFILE=65536`. macOS, FreeBSD and NetBSD are supported.		

Figure 10-5. Sizing recommendations

Small Installation: Up to 50 Concurrent Users

The measured system used 77 MB of real storage and 14 percent of one core with 50 stressed sessions. The smallest virtual machine offered by most providers is sufficient; the operating system, not 3270BBS, determines the size of real storage. Use SQLite on the local disk. A solid-state disk is recommended even here, because every change of screen writes to the database. Back up `tsu.db` daily with `sqlite3 tsu.db ".backup file"`.

Medium Installation: Up to 500 Concurrent Users

By extrapolation, 500 active users need about 390 MB of real storage for 3270BBS, or about 800 MB with the safety margin, and about 1,000 goroutines. Two virtual processors give ample headroom for realistic use, in which each user changes screen every 15 to 30 seconds; the second processor absorbs logon bursts (each logon costs about 58 milliseconds of processor time, so 500 users logging on after a restart cost about 30 seconds of processor time) and BASIC or assembler programs, each of which may occupy one processor for up to 15 or 40 seconds. SQLite remains adequate on a local solid-state disk. Raise the file-descriptor limit to at least 4096: every connection, every database connection and every log file uses one. Expect TCB to read red from about 55 users on; this is normal.

Large Installation: More Than 500 Concurrent Users

Use PostgreSQL on its own server with solid-state (NVMe) storage. Above a few hundred active users the single writer of SQLite and the processor time of the chat fan-out become the limits, and both are relieved by spreading users over several instances of 3270BBS that share one PostgreSQL database (see Several Instances). Size each instance as a medium installation for its share of users, and set `max_connections` of PostgreSQL to at least 100 per instance plus 20 for administration and scripts. Users can be spread over the instances by DNS (several address records for one name) or by publishing one host name per instance; 3270BBS contains no load balancer.

Run each instance under systemd with `Restart=always` and `LimitNOFILE=65536` (as installed by `add_service.bash`), take a `pg_dump` at least daily, and watch the SDSF heading and DELTAMON of every instance, because each shows only its own users and load. Trim the activity log regularly (see Disk Growth).

Connection Limits That Affect Sizing

3270BBS accepts at most seven TN3270 connections (plain and TLS together) from one remote address, and 80 from one local address. Users who share one public address, for example behind the network address translation of a school or a company, can therefore hold at most seven sessions between them. The limit cannot be changed in `tsu.cnf`. web3270 accepts at most 50 sessions in total and five per client address, and SSH at most 64 open connections. A medium or large installation that relies on web3270 or SSH needs several instances for that reason alone. The finger daemon accepts 20 connections (3 per address) and the SMTP server 10 (3 per address); FTP and HTTP have no connection limit.

Choosing and Tuning the Database

The database is selected by the `db` keyword of `tsu.cnf`: `sqlite3` (the default) or `pg`.

SQLite

SQLite keeps the whole database in the file `tsu.db` in the working directory and runs inside the 3270BBS process; it needs no administration and is the right choice for most installations. 3270BBS sets the following properties, which cannot be changed in `tsu.cnf`:

Property	Value and effect
`journal_mode`	`WAL`. Readers do not wait for the writer, and the writer does not wait for readers. The mode is recorded in the database file. Besides `tsu.db`, the files `tsu.db-wal` and `tsu.db-shm` exist while the system runs; they are part of the database.
`page_size`	4096 bytes.
`busy_timeout`	10000 milliseconds. A write that finds another write in progress waits up to ten seconds before it fails.
`wal_autocheckpoint`	1000 pages. When the WAL file holds about 4 MB, its contents are copied back into `tsu.db`.
`Connection pool`	At most 25 open connections, 10 of them kept idle, each replaced after one hour.

Figure 10-6. SQLite properties set by 3270BBS

SQLite allows one writer at a time. Every change of screen by any user writes two rows (the current activity of the user and an entry in the activity log); posts, mail, chat lines and logons write more. Because every transaction is forced to stable storage before it completes, the write rate that the database can sustain is set by the latency of the disk. On a solid-state disk this is several thousand transactions a second and is never the limit; on a rotating disk it is of the order of a hundred a second, which a few hundred active users can reach. Place `tsu.db` on a solid-state disk, and never on a network file system: SQLite's locking is not reliable on NFS or SMB shares.

PostgreSQL

PostgreSQL is a separate database server. The schema is created by `create_postgres_db.bash`, and an existing SQLite database is copied into it by `migrate_sql_postgres.bash`. 3270BBS opens at most 100 connections to PostgreSQL per instance, keeps up to 25 idle, closes an idle connection after two minutes and replaces every connection after five minutes. The PostgreSQL parameter `max_connections`, whose default is 100, must therefore be at least 100 times the number of instances, plus the connections of administrators and maintenance scripts. If the newsgroups database is on the same server, add 25 for it.

Move to PostgreSQL when one of the following applies:

- More than one instance of 3270BBS is to serve the same community (see Several Instances).
- The database must be on a different machine from the program, or must be backed up, replicated or inspected with the tools of a database server while the system runs.
- DBMON shows the average database response time rising with the load, which with SQLite means that the single writer has become the bottleneck; in practice this occurs only with several hundred active users or a slow disk.

Size alone is not a reason to move: SQLite handles databases of many gigabytes, and the measurements in The Integrity Check at Startup show that the size of the database has little effect on the cost of the operations that 3270BBS performs.

Several Instances

Several instances of 3270BBS, on one machine with different ports or on different machines, may use the same PostgreSQL database. The instances share all stored data: accounts, conferences, posts, mail and chat. A chat line posted on one instance reaches the chat users of another instance when that instance next reads the `chat` table, that is, within ten seconds. The state that is held in storage is not shared: the count of online users on the menus, the SDSF display and the performance monitors show only the users and the load of the instance on which they are displayed, and an `@ai` question is answered only by the instance on which it was asked. A user who logs on to two instances at the same time holds two independent sessions. 3270BBS does not otherwise coordinate the instances; start the optional servers (SMTPD, FTPD, SSHD, HTTPD, PROXY3270 and FINGERD) on one instance only, unless each instance has its own address. Several instances on SQLite are not supported.

Disk Growth

The database grows with the activity of the users and shrinks only when rows are deleted and the space is reclaimed. The following figures were measured by inserting 100,000 rows of each kind into an empty database created with `create_tsudb.bash` and comparing the file sizes after a checkpoint. They include the indexes of each table.

Row	Table	Measured size	Rule of thumb
`Chat line`	`chat`	156 bytes for a 40-character line	115 bytes + text
`Post`	`posts`	684 bytes for 600 characters	85 bytes + text
`Mail`	`messages`	586 bytes for 500 characters	85 bytes + text
`One-liner`	`oneliners`	142 bytes for 60 characters	80 bytes + text
`Activity entry`	`activity`	49 bytes	50 bytes

Figure 10-7. Measured size of database rows (SQLite)

An activity entry is written at every change of screen (repeated entries for the same screen within a short interval are suppressed), so the activity log is usually the table that grows fastest. As an example, a community with 500 concurrent users at peak might produce in one day 5,000 chat lines, 300 posts of 800 characters, 1,000 mails of 600 characters and 100,000 changes of screen. By the rules above this is about 0.8 MB of chat, 0.3 MB of posts, 0.7 MB of mail and 5 MB of activity entries a day, or about 2.5 GB a year, of which 1.8 GB is the activity log. PostgreSQL stores the same rows with a larger overhead per row; allow half as much again.

The tables are trimmed on the DB Maint display (option `D` of the main menu, administrators only): option 1 removes a percentage of the oldest activity entries, options 2, 3 and 4 remove mail, chat lines and one-liners older than a given date, and option 9 (Vacuum) returns the freed space to the file system. The scripts `prune_old_activity.bash`, `prune_old_chat_messages.bash` and `prune_old_messages.bash` do the same from the shell for SQLite; for PostgreSQL the scripts are `prune_old_activity_from_pg.bash`, `prune_old_chat_messages_from_pg.bash` and `erase_old_all_msgs_from_pg.bash`. Trim the activity log regularly.

Log Files

3270BBS writes its log to standard error and, at the same time, to a new file `temp/syslog_`*`yyyymmdd_hhmmss`*`.log` (UTC) in the working directory, created at each start. The file is not rotated; it grows while the system runs and is replaced by a new file at the next start, while the old files remain in `temp/`, where they are also listed as held output. The last 1000 entries are kept in storage for the LOG command of SDSF. The FTP server appends to `ftp.log`.

Standard error goes wherever the program was started from. Under systemd, as installed by `essential_scripts/add_service.bash`, it goes to the journal, whose size is limited by the settings of journald. `start_bbs.bash` on Linux appends it to `/var/log/tsu.log`, which nothing rotates; add an entry for it to `logrotate` with the `copytruncate` option, because the file is held open by `tee`. Remove old `temp/syslog_*.log` files periodically, for example with a `cron` job that deletes files older than 90 days.

The Integrity Check at Startup

When the database is SQLite, 3270BBS runs `PRAGMA integrity_check` on `tsu.db` at every start, before any server accepts connections. The check only reads the database. Its result is written to the log and shown in the `Integrity:` field of the DB Maint display, where option 10 repeats the check on demand. A failed check is logged but does not stop the system from starting, so that a damaged database causes a visible problem rather than a loop of restarts.

The check reads every page of the database. Measured on the test machine described in Measured Resource Use, with the file in the cache of the operating system, it took 0.15 seconds for a 162 MB database and 0.44 seconds for an 847 MB database. When the file is not in the cache, the time is bounded by the time needed to read the file once: about two seconds per gigabyte on a solid-state disk and ten seconds per gigabyte or more on a rotating disk. The startup cost is therefore negligible for any database that fits the recommendations of this chapter.

SQLite has no repair function. If the check fails, take a backup of the damaged file first, then make a clean copy with `sqlite3 tsu.db "VACUUM INTO 'tsu-rebuilt.db';"`, or, as a last resort, recover what can be read with `sqlite3 tsu.db ".recover" | sqlite3 tsu-recovered.db`, and replace `tsu.db` with the result while the system is stopped.

Backups

3270BBS makes no automatic backups. With SQLite, use the backup command of the `sqlite3` program, which takes a consistent copy while the system runs:

Command	Purpose
`sqlite3 tsu.db ".backup tsu-backup.db"`	Takes a consistent copy of the running database.
`sqlite3 tsu.db "VACUUM INTO 'tsu-copy.db';"`	Takes a consistent, compacted copy.
`pg_dump`	Takes a consistent copy of a PostgreSQL database.

Figure 10-8. Backup commands

Do not copy `tsu.db` with `cp` while the system runs: in WAL mode part of the data is in `tsu.db-wal`, and a plain copy can be inconsistent. Run the backup from `cron` at least daily, keep several generations, and keep at least one generation on another machine. Also keep `tsu.cnf`, the TLS certificate and key, and the SSH host key file with the backups.

Monitoring and Responding to Alerts

The SDSF activity display shows in its heading the number of goroutines (TCB), the storage (MEM), the processor use of the host (CPU) and the peak number of concurrent users since the start (MAX). DELTAMON shows the same metrics as bars, DBMON (**`F11`** from DELTAMON) the database transactions, and the per-user processor display (**`F12`** from DELTAMON, or `M;P;U`) the processor time of each user and service. The following table describes what a red reading means and what to do about it.

Reading	Meaning and action
`CPU red`	The host is more than 75% busy. Open the per-user processor display to find the user or service responsible. A BASIC or assembler program ends by itself within 15 or 40 seconds. A user who consumes processor time continuously can be logged off with `C U=`*`userid`* on SDSF. If the load is spread over many users, the machine is too small.
`MEM red`	The process holds more than 130 MB. MEM grows by about 0.13 MB per logged-on user (see Measured Resource Use), so this reading is expected only above about 850 concurrent users. Otherwise compare MEM with the number of users: storage that keeps growing while the number of users does not indicates a fault; note the readings and restart the system at a quiet time, for example with `$PJES2,REIPL`, which restarts the program when it is run under `start_bbs.bash` or under systemd with `Restart=always`.
`TCB red`	More than 120 goroutines. Each user accounts for about two, so this is normal above about 55 concurrent users and does not by itself require action. A count that is much larger than twice the number of users indicates sessions or connections that are not being closed; compare it with the Connections reading and with the users listed on SDSF.
`Connections red`	More than 250 established TCP connections on the host. Each TN3270 user holds one; each web3270 user and each PROX3270 session holds more than one, because the connection onward to the system or to the remote host is counted as well. Check that the file-descriptor limit is adequate (see Sizing Recommendations).
`GC ms red`	A garbage-collection pause exceeded 0.8 milliseconds. Isolated readings are harmless. Persistent readings indicate that the host is short of processor time or is paging.
`Paging red`	The host is short of real storage. Add storage or move other work off the machine.

Figure 10-9. Responding to red readings

Accuracy of the Processor Figures

The processor percentage of each user is derived from the samples of the Go processor profiler over the last three seconds and is expressed as a percentage of one processor, so that a user who keeps one processor busy reads 100.0 on any machine. The heading figure is the use of the whole host. On a machine with one processor the two agree; on a machine with several processors the user figures may add up to more than the heading figure.

The profiler depends on a timer signal of the operating system. On Linux the signal is delivered accurately. On macOS somewhat fewer signals are delivered than requested, so the user figures read about one fifth low. On NetBSD the signal is limited for the whole process rather than for each thread, so on a machine with several processors the user figures read considerably low. On both systems the figures remain correct relative to one another and serve to find the user who consumes the most processor time; for absolute figures use the heading, or the tools of the operating system.