TEMPERATURE DATA TRENDS

Administrator's Guide

Contents

1. Overview

Temperature Data Trends (TDT) is a **mobile app** that enables individuals to easily report their temperature and health status on a timely basis to public health officials, combined with a **monitoring system** that tracks the reports and sends alerts on any emerging issues.

Once installed by the user with an activation link provided by the user's public health agency, the TDT app prompts the user for a temperature and symptom report at configurable intervals and reports the data to the agency. The individual can also choose to self-report at any time without waiting for a prompt.

Meanwhile, authorized public health officials have access to the incoming data in real time, presented as a current-status summary sheet that lists all users, plus a detailed individual history sheet and graphic display for each user. These tools can help spot trends and identify individuals who fall behind on reporting. When warning signs appear, the system automatically sends email alerts to designated observers.

Behind the scenes, the mobile device uploads the data in real time to an online form that automatically stores the data in an online spreadsheet. The form and spreadsheet "in the cloud" are created and controlled by the public health agency, which also controls who can access the data. Designated public health officials can view the spreadsheet data in a web browser – as a log of all data received, a running log for each user, or a summary of the latest readings for all users.

Using an online spreadsheet allows officials a direct view of the incoming data in real time, and provides easy access to the data in a familiar format for offline analysis. Since no actual programming is required, relatively non-technical users can start their own separate data sets to handle different populations of users, with little or no assistance from IT staff.

As an alternative to the mobile app, users can enter their readings directly into a form on the Web. This is intended for users who don't have an Android device, but may have another device such as an iPhone, iPad, Windows computer, etc. The trade-off is that these users will not have the automatic reminders provided by the Android app.

2. Getting Started

Temperature Data Trends (TDT) requires a computer with a standard high-speed Internet connection and a recent version of the Chrome browser. Setting up TDT for the first time typically takes about 30 minutes.

Here are the general steps:

1. Create an **admin account**
2. Create a **data-entry form**
3. Set up the **data sheet**
4. Decide on a **scheme for user IDs**
5. Set up **links for users**
6. Send **instructions and custom links** to users

The system is designed to use several Google products, including Google Forms, Google Sheets, and Google Drive, that must be administered with a Google account. For this, we recommend creating a Gmail account that's used only for this purpose. The account and all of these products are free (and subject to the applicable terms of service). If you find that you need higher capacity or more advanced administrative features, you can set up more accounts or use a Google Apps for Work account as described under System Administration.

At some point it may be desirable to create multiple, separate instances of TDT. One reason to do this would be to create separate data sets for different teams, different agencies, or different populations. When setting up multiple TDT instances, we recommend creating a separate admin account for each instance. With this approach, each admin account has its own files in Google Drive, its own series of user IDs, its own separate URLs for users, and so on. This avoids overlap between filenames, permissions, group mailing lists, and helps prevent exposing private user data to the wrong group admins.

As a separate issue, you may also wish to set up an email distribution list or "group mailing list" for sending out automated alerts. The System Administration chapter describes how to do this.

1. Create an admin account

1. Open a Chrome browser and navigate to https://gmail.com. Log out of your existing account, if necessary, and create a new account. This takes only a minute or two. You'll need to designate a contact person and come up with a unique account name, which will be used as the email address at Gmail. For instance, you might use something like *city-st-TDT* or *agency-department-TDT*.
2. Note the account name and password for safekeeping. Leave this tab open, and remain logged in to this account for the rest of the setup procedure.

3. You may want to email this Admin Guide (or a link for it) to yourself at the new email address, and keep the guide open on-screen while you do the installation.

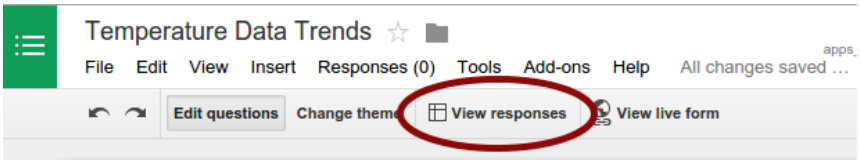
2. Create a data-entry form

1. Open a new browser tab and navigate to https://drive.google.com/. If prompted, log in to your admin account; otherwise verify (in the top right corner of the page) that you are logged in with your admin account.
2. Click the **NEW** button, then choose **More** and **Google Forms**. This opens a new tab and displays a new, untitled form. In the menu at the top of the form, choose **Tools**, **Script editor**. In the dialog box, under **Create script for**, choose **Form**. This opens a new tab with an editor containing a sample Apps Script script. We'll replace this script with a script that will set up your data-entry form.
3. To get the setup script, open a new tab and navigate to:
4. https://raw.githubusercontent.com/clc/temperaturedatatrends/master/visualization/google_forms_appscript/setupformscode.gs
5. Select the entire script (Ctrl-A or ⌘A) and copy it (Ctrl-C or ⌘C). Then close that tab.
6. Switch back to the tab with the sample script in it. Select the entire script (Ctrl-A or ⌘A) and replace it by pasting in the new script (Ctrl-V or ⌘V).
7. Press Ctrl-S or ⌘S to save the script. When prompted, enter "TDT Setup" as the project name and click **OK**.
8. In the menu at the top of the page, select **Run**, then **createForm**. When prompted, authorize the script by clicking **Continue** and **Accept**. The script saves the resulting data-entry form with the name "Temperature Data Tracker".
9. Close the editor tab and the tab for the Untitled form. In the Drive tab you'll find two new forms listed – "Untitled form" and "Temperature Data Trends". Right-click on "Untitled form" and **Remove** it to keep things tidy.

3. Set up the data sheet

Create the sheet & enter the script

1. Double-click on the "Temperature Data Trends" form to open it in a new tab. Bookmark this page for later access, labeled "TDT Form - Admin".
2. At the top of the form, click the **View Responses** button to create a spreadsheet that will store your incoming data.



If prompted, choose to create a **New spreadsheet** and click **Create**. Bookmark this page for later access, labeled "TDT Data Sheet".

3. In the menu at the top of the spreadsheet, choose **Tools**, **Script editor**, then **Blank Project**. This displays the script editor and a few lines of Apps Script code. We'll

replace this with a script containing functions your data sheet will use to update the data display.

4. To get the function script, open a new tab and navigate to: https://raw.githubusercontent.com/clc/temperaturedatatrends/master/visualization/google_spreadsheet_appscript/Code.gs
   Select the entire script (Ctrl-A or ⌘A) and copy it (Ctrl-C or ⌘C). Then close that tab.
5. Switch back to the tab with the sample script in it. Select the existing script (Ctrl-A or ⌘C) and replace it by pasting in the new script (Ctrl-V or ⌘V).
6. Press Ctrl-S or ⌘S to save the script. When prompted, enter "TDT Functions" as the project name and click **OK**.

Set up triggers to run the update functions

1. In the menu at the top of the TDT Functions page, select **Resources**, then **Current project's triggers**.
2. Click the link to "add one now". Select "periodicCheck" and "Time-driven". This function highlights users who are overdue for an update. We suggest choosing "Hour timer" and "Every hour" for running this function, but you can choose other settings if you prefer.
3. Click the link to "Add a new trigger". Select "onFormSubmit", "From spreadsheet", and "On form submit". This function processes new entries as they arrive.
4. Click **Save** to save the triggers. When prompted, grant authorization.

Customize the settings

Near the top of this script on the TDT Functions page (lines 23-26) are four important configuration items, looking something like this:

```
var recipients = "MY_ACCOUNT@gmail.com";
var spreadsheetUrl =
"https://docs.google.com/spreadsheets/d/SOME_REALLY_RANDOM_LOOKING_STRING/edit";
var maxHoursBetweenReadings = 12; // Default is 12 hours to enforce twice a day measurement.
var temperatureThreshold = 100.4; // Any value greater or equal to this will result in an alert email.
```

1. Edit these values for your installation as described in the table below.

Setting	Notes
recipients	Enter your admin email address.
spreadsheetUrl	Set this to the URL of the data spreadsheet (the one you bookmarked as "TDT Data Sheet"). To do this, first delete the sample URL that's between the quotation marks for this variable. Then go to the data spreadsheet. In the browser's address bar, copy the entire URL up to "/edit" ("https://docs.google.com/spreadsheets/.../edit"). Do not copy anything after ".../edit". Paste the URL between the quotation marks as the value of *spreadsheetUrl*. **Important:** Be sure to remove everything that comes after ".../edit" in the URL.
maxTimeBetweenReadings	This is the maximum amount of time that should elapse

	between updates from a user. By default it is set for 12 hours. Change it if you want to use a different value.
temperatureThreshold	This is the threshold temperature; any submitted reading that is equal to or greater than this value triggers an alert and causes the user data to be highlighted in red in the Summary display. By default this is set for 100.4 degrees Fahrenheit.

2. Press Ctrl-S or ⌘S to save the script again. Close the editor tab.

Your form and data spreadsheet are set up. Now we need to set up the users to start entering data.

4. Decide on a scheme for user IDs

Each user who is entering data must have a unique User ID that identifies their data. You should come up with your own scheme for these IDs, with the following notes in mind:

1. Use alphabetic and numeric characters only. Spaces and other characters won't work.
2. Do not include any information that could connect back to the user, such as name, initials, birth date, or social security number. It is important to keep any identifying information in a secure place with appropriate access restrictions.
3. A user ID could reasonably consist of X hexadecimal digits, allowing each sheet to uniquely contain 2^(4*X) participants without re-using identifiers. An ID of 4 hexadecimal digits balances ease of use and having a sufficient address space for handling a potentially large set of participants (e.g. 2^(4*4) = 65536).
4. To ensure uniqueness, include sequential numbers in your scheme, e.g., *1001*, *1002*, *1003…* or *A001*, *A002*, *A003*.... If you use all-numeric IDs, start with a large number such as *1000*, and make sure that all the IDs have the same number of digits so that they sort correctly in an alphabetic sort. Zero-filled numbers (*0001*, *0002*, *0003*...) won't work because the data spreadsheet trims out leading zeros.
5. Once an ID has been used to submit data, don't reassign it to any other user.

5. Set up links for users

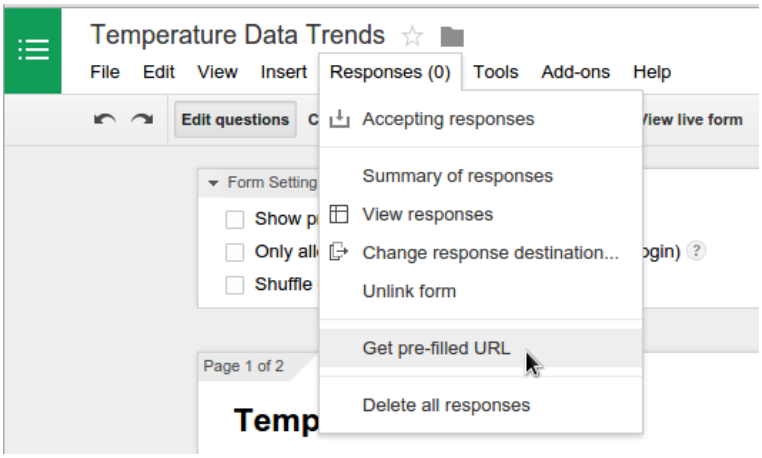
To enter data, each user needs a unique User ID and:

- if using the Android app, a custom link that activates their copy of the app
- if using the web form, a custom link that displays the web form with their user ID

This section describes the two steps involved in setting up these custom links. First, you'll generate a base URL for your form using specified mock values. Then, on a separate page, you'll use this base URL to generate the actual custom links for your individual users.

Generate a base URL

To create the base link, go to your form (bookmarked as "TDT Form - Admin"). From the menu at the top of the form, choose **Responses**, then **Get pre-filled URL**, as shown here:



This opens a new tab containing a copy of your form. In the form, enter the following mock data values exactly:

UserID: "user"
Temperature: "100"
Feeling: "Sick"
Symptoms: "Headache"

Be sure that you enter these exact values! Click **Submit**. At the top of the page, notice the long URL in the **Share the link** text box. Click on the URL, select the entire URL (Ctrl-A or ⌘A) and copy it (Ctrl-C or ⌘C) to copy the URL. This base URL with the mock values provides the basis for the custom links for your users.

Generate custom links

In the browser, navigate to TDT Link Generator page at this link: http://htmlpreview.github.io/?https://github.com/clc/temperaturedatatrends/blob/master/visualization/tdt_link_generator.html. *(This web page may include instructions that you've already followed – you can safely ignore them.)*

Paste your base URL, copied in the last step, into the field labeled **Enter Pre-filled URL here**. The mock values you entered earlier will be discarded but are required for this process. You can now use this page to generate custom links for multiple users. To do so, enter your agency name, the number of hours to between prompts to the user, and a user ID, then click **Generate links**. This runs a JavaScript program that generates two links, which are displayed at the bottom of the page: an activation link for the TDT Android app and a custom URL for the online web form.

By repeatedly entering unique User ID values and clicking the **Generate** button, you can generate custom links for multiple users. And you can always come back at a later time and follow the same process – generate the base URL, paste it into the TDT Link Generator page, and enter User IDs to generate links.

Important: Use caution! If you send the same user ID or links to multiple users, their entries will be mixed together in the system with no way to distinguish them.

6. Send instructions and custom links to users

In a typical scenario, you'll send each user an email containing information and one or more links, as described below. You'll find some ideas for your email templates in Appendix 2.

TDT Android app users

Users of the TDT Android app need a link to download the app, plus a custom activation link to configure and activate the app. Without the activation link, the app is not enabled to post the data to your spreadsheet. So the email to these users should include:

- Instructions (this may include the printed instruction sheet for installing the app)
- Their unique user ID
- The installation link for installing the TDT app at the Google Play Store:
  https://play.google.com/store/apps/details?id=net.clcworld.thermometer
- The custom TDT activation link you created for their user ID with the TDT Link Generator

Web form users

Users of the online web form should use the custom link to navigate to the web form and pre-load it with their user ID.

- Instructions (this may include the printed instruction sheet for installing the app)
- Their unique user ID
- The custom link to the web form that you created for their user ID with the TDT Link Generator
- A note explaining how to bookmark that custom URL for continued use

* * *

That concludes the setup procedure. To view the data spreadsheet in action, read on to the next section – bearing in mind, of course, that there's no data in the spreadsheet until users start making entries.

3. Using the spreadsheet

You can navigate to the spreadsheet by clicking on your spreadsheet bookmark ("TDT Data Sheet") in Chrome. When you first set up the system, there's no data in the sheet until users start entering their readings. New readings usually appear in the spreadsheet almost instantly.

The spreadsheet data is constantly updated as new reports arrive, whether or not the spreadsheet is currently loaded in a browser tab. The sheet includes:

- a "Form Responses 1" tab that contains one row for every temperature report
- a "Summary" tab that contains one row for each user
- a tab for each user, labeled with the User ID, in alphabetic sequence

When a new temperature report is submitted, it appears instantly at the bottom of the Form Responses 1 tab. The user's tab is updated immediately; it the report is for a new user, a new tab is inserted among the others in alphabetical order by User ID. In the Summary tab, the row for that user in the Summary tab is updated with the new information.

Summary tab

The summary tab includes one row for each user, showing the user's most recent report. Cells are highlighted to indicate possible issues as shown in this table.

Trigger condition	**Response**
Triggered when the period of time since the user's most recent report exceeds the configured maximum report time (12 hours by default). Updated hourly or as configured in *maxTimeBetweenReadings*.	• **Last entry** cell is highlighted until a more recent report is received. • Alert is sent every cycle until a fresh report is received.
Triggered when the user's most recent reported condition is "Sick".	• **Feeling** cell is highlighted whenever the user reports as *Sick*. • Alert is sent whenever *Sick* is reported.
Triggered if the user's temperature is greater than or equal to the configured threshold temperature (100.4 by default).	• **Last temperature** cell is permanently highlighted once the threshold temperature is passed. • Alert is sent any time the temperature reaches the threshold temperature. Once this happens, the **Max temperature** cell is permanently highlighted.

If a user's condition returns to *Well*, or if a delinquent user reports in again, the cell returns to the normal color. But once a user's **Max temperature** reaches or exceeds the threshold temperature (100.4 by default), the **Max temperature** for that user is permanently highlighted.

Email alerts

As shown in the table of trigger conditions and responses above, TDT automatically sends an alert message to the email address you specified for *recipients* when customizing the settings. The message subject begins with "[TDT ALERT]" and includes the User ID and the category of issue. The message content provides the details, such as the temperature reading.

Charts

To display a graphical chart for an individual user's temperature over time, go to that user's tab in the data spreadsheet. On the spreadsheet menu, select **Temperature Data Trends**, then **View chart**.

When viewing a chart, hovering the mouse over a point on the line displays the data for that point.

To remove the chart, click on the chart, then click the down arrow at the top right corner of the chart and choose **Delete chart**. You can recreate the chart at any time.

To move the chart, click on the chart, then choose the eye icon in the top left corner of the chart. You should then be able to move the chart by clicking and dragging in the top area of the chart.

4. System Administration

Admin privileges

Be careful with the password of the admin account, but make sure that at least two people have it in case of trouble. Make sure that everyone who has this responsibility knows how to find these files in Drive.

Data backups

A running short-term backup of the spreadsheet is automatically maintained in the cloud, but it only goes back as far as the last 100 updates. The chance of data loss in the Google Drive storage system is extremely small, but data could potentially be lost through user error or an unforeseen problem with the application. For this reason, it's a good idea to make a backup copy of the spreadsheet at least once per day. It takes less than a minute, does not interrupt the software cycle, and can easily become part of the daily routine. To make a copy on your local disk, navigate to the spreadsheet and choose **File**, **Download as**, and choose XLSX, ODS, CSV, or TSV format. To make a copy in the Drive cloud, choose **File**, **Make a copy**. Use a filename scheme that includes the date, such as "TDT 10-31-14". A typical backup plan might retain daily backups going back one or two weeks, and weekly or monthly backups going farther into the past. This helps provide protection if errors occur in the data but aren't noticed right away.

Setting up a group mailing list

Temperature Data Trends sends automated email alerts to the email address identified as *recipient* in the TDT Functions script. (See Customize the settings for how to set this.) This is typically the address of a group mailing list that includes everyone who should receive the alerts. For this purpose, you can set up a group email address in your agency email system, or use a Google Group, or (as described in the setup instructions) just use your admin Gmail account.

To set up your admin Gmail account to forward the alerts:

1. While logged in to the admin account, navigate to https://www.google.com/contacts and add a Contacts group. Add the desired email addresses to the group.
2. In Gmail, go into the Settings and add a forwarding filter that catches emails with a subject that includes "[TDT ALERT]" (no quotation marks) and forwards them to the Contacts group.

Account limitations and Google Apps

If the volume of alerts is very high, you may begin to run into the daily email limits on free Google accounts. (This depends on several variables, but for planning purposes you can estimate this at up to 400 emails per day.) If that happens, you have two options:

1. Create additional accounts and TDT instances.

2. Switch to an account with Google Apps for Work or Google Apps for Government. These provide higher limits on volume, more administrative features, and options for using other apps and services.

The limit depends on several variables, but for planning purposes, estimate 250 emails per Gmail account day.)

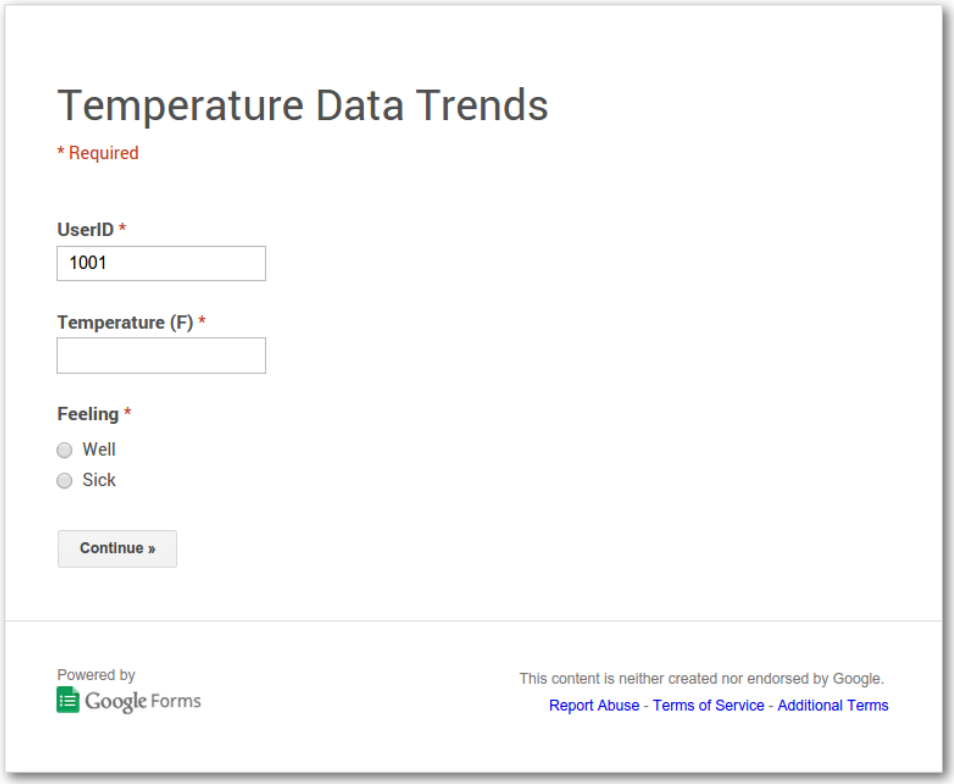
Technical support

If the system does not behave as expected, or if you have questions, please reach out to your support contact. This will help keep your system up and running and resolve any issues with the application or the documentation.

Appendix 1: Using the web data-entry form

As an alternative to using the Android app, users can enter data directly into a web form that stores data in your spreadsheet. The web form works on almost any Internet-connected device that has a browser, such as a Windows computer or an iPhone. Unlike the Android app, however, it doesn't remind the user when it's time for another reading.

The user should access the web form by using a custom URL as described in Generate custom links. When the user arrives at the form, the User ID field is pre-populated with their User ID, as shown below. This will help prevent errors in the User ID field.



The user fills in the **Temperature** field, selects a **Feeling** of either *Well* or *Sick*, and clicks **Continue**. If the users selected *Well*, they can then click **Submit** to finish the entry. If the users selected *Sick*, a list of specific symptoms is presented, and they can check all that apply before clicking **Submit**.

Appendix 2: Sample templates for user emails

The sample email templates below are provided to get you started designing your own email templates. Your actual email templates should be customized to fit your own workflow, audience, context, style, and so on. A typical email to users might include:

- Explanation and instructions to the user
- The user's unique User ID in the text of the email
- Link(s) necessary for installing/activating the app or using the web form
- An attached PDF or a link to online user instructions
- Contact information to help the user reach you as needed

Sample email template for Android app user

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TDT is a mobile app that makes it easy to share your temperature readings and health status with public health officials. The information you enter is transmitted to your public health agency. There, officials will monitor your status and may contact you for more information.

Use the provided thermometer and follow your assigned schedule. Do not eat or drink immediately before taking your temperature.

Your User ID in this program is: <User ID>.

To use the Android temperature-tracking app, you'll need an Internet-enabled Android device (smartphone, tablet, or computer). The link below will take you to the Google Play Store, where you can easily install the app. The app is free, but your normal Internet data charges will apply when downloading and using it.

Installation link: <link>

Once the app is installed, return here and continue.

Click the link below to automatically configure the app for use in our monitoring program. **Important: This activation link is unique to you. Do not share it with anyone else, or let anyone else enter data into your app.**

Activation link: <link>

...

Sample email template for web form user (iPhone, Windows, etc.)

...

TDT is a mobile app that makes it easy to share your temperature readings and health status with public health officials. The information you enter is transmitted to your public health agency. There, officials will monitor your status and may contact you for more information.

Use the provided thermometer and follow your assigned schedule.

Remember: Do not eat or drink immediately before taking your temperature.

Your User ID in this program is: <User ID>.

To enter your data into the monitoring program, you'll need an Internet-enabled smartphone, tablet, or computer with a web browser. Using the service is free, but your normal Internet data charges will apply when using it.

The first time you visit the page, be sure to bookmark it in your browser. This will make it easy to return to the page in the future. In most desktop or laptop browsers, you can press Ctrl-D or ⌘D to create a bookmark. In the Chrome browser on a mobile device (iPhone, etc.), click the star icon to bookmark a page.

Important: This link below is unique to you. Do not share it with anyone else, or let anyone else enter data using your unique User ID.

Online web form: <link>

…