Updating Go Installations  
with the  
Latest IANA Time Zone Data

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## Introduction

### IANA Time Zone Information

The *Go* programming language relies on time zone information provided by the IANA Time Zone database. This database is widely recognized as the leading authority on world time zones.

Reference:

<https://en.wikipedia.org/wiki/List_of_tz_database_time_zones>

<https://en.wikipedia.org/wiki/Tz_database>

The IANA Time Zone data base and reference information is located at:

<https://www.iana.org/time-zones>

<https://data.iana.org/time-zones/releases/>

### Go Relies on IANA Time Zone Database

The *Go* Programming Language uses IANA Time Zones in date-time calculations.

Reference:

<https://golang.org/pkg/time/#LoadLocation>

<https://golang.org/pkg/time/>

### Go Provides for IANA Database Updates

The IANA Time Zone database is updated throughout the year as warranted by time zone modifications initiated by nation states. In order to stay current with time zone modifications, the end-user has the option of updating the local *Go* installation with the latest version of the IANA Database. *Go* does not automatically update the time zone data base. This task is therefore left as manual operation to be performed by the end-user.

## Existing Go Time Zone Configuration

### Configuration Overview

#### Directory/Folder Structure

Go is typically installed on a drive in the ***Go*** directory or folder. A common Windows installation would install ***Go*** on C-Drive as follows:

C:\Go

#### The Go Time Directory

Time zone information is stored in this directory structure under the ***Go\lib\time*** directory. Following the example above, on Windows, this would be styled as follows:

**C:\Go\lib\time**

This ***Go*** directory is also defined by the environment variable $GOROOT. Therefore, the Go time directory could also be defined as:

**$GOROOT/lib/time**

#### zoneinfo.zip

All time zone information is contained within a file residing in the ***Go\Lib\time*** directory named, ***zoneinfo.zip***. Using the example above this would equate to a path, file name, file extension of ***C:\Go\lib\time\zoneifno.zip***.

This path and file name could also be referred to as:

$GOROOT/lib/time/zoneinfo.zip

#### update.bash

This file also resides in the **Go\lib\time** directory (a.k.a. $GOROOT/lib/time). This bash file is used to generate a new ***zoneinfo.zip*** file. Following the example cited above the path, file name and file extension for this file would be styled as follows:

***$GOROOT/lib/time/update.bash***

### Upgrading Go Time Zone Configuration

To upgrade the time zone data for your Go installation, you will need to create a new version of ***zoneinfo.zip*** containing the latest IANA Time Zone information.

## Objective - Create New File: *zoineinfo.zip*

To update time zone information in ***Go*** it is necessary to update the ***zoneinfo.zip*** file described in the previous section.

Therefore, the objective is to create a file named *zoneinfo.zip* and copy it to the appropriate directory thereby replacing the old version of ***zoneinfo.zip***. Once this operation is completed, the new version of ***zoneinfo.zip*** will be used by ***Go*** to correctly process time zones anywhere in the world using the latest IANA time zone data.

When you finish building the latest version of the *zoneinfo.zip* file, make sure it is copied to the ***Go*** time directory:

***$GOROOT/lib/time/zoneinfo.zip***

## Two Methods for Updating Go Time Zone Data

### Method-1 The Easy Way: ***update.bash***

#### Step-1 “Safety First”

1. Make a backup copy of the time zone information file: ***$GOROOT/lib/time/zoneinfo.zip***.
2. Create a new, empty scratch directory which can be used for time zone update operations. Example: ***D:\tz***.

#### Step-2 Copy *update.bash* to Scratch Directory *D:\tz*

1. The File ***update.bash*** resides in the Go time directory: ***$GOROOT/lib/time/update.bash***
2. Copy ***update.bash*** to the new empty, scratch directory created in Step-1, above.

**Copy ->**

From: ***$GOROOT/lib/time/update.bash***

To: ***D:\tz\update.bash***

#### Step-3 Modify *update.bash*

After copying update.bash to the scratch directory, it will be necessary to modify this bash script using a text editor.

1. Point your browser at <https://www.iana.org/time-zones> .
2. Make a note of the latest time zone version. Example: ***2019c***
3. Open the scratch directory version of ***update.bash*** in a text editor (see Step-2 above: ***D:\tz\update.bash***).
4. Locate the bash script section labeled **“# Versions to use.”** in your text editor.
5. Modify the “CODE” and “DATA” variables to reflect the latest time zone version captured in Step-3 a, above.

**From:**

**CODE=2019b**

**DATA=2019b**

**To:**

**CODE=2019c**

**DATA=2019c**

Instead of “2019c” you will of course use the latest IANA time zone version.

1. Save the modified ***update.bash*** file and exit your text editor.

#### Step-4 Execute *update.bash* Script

1. Open a terminal window and change directories to the scratch directory (i.e. make the scratch directory the current window.

On windows this means using ***Cygwin***. Change Directory to scratch directory, ***D:\tz***.

**cd /cygdrive/d**

**cd ./tz**

1. Now, execute the bash script.

**./update.bash**

1. If all went well and no errors were emitted, the following final message should be displayed in the terminal window:

**“New time zone files in zoneinfo.zip.”**

1. Close the Terminal Window
2. Assuming a successful bash script execution, only two files should remain in the scratch directory:
3. **update.bash**
4. **zoneinfo.zip**

This ***zoneinfo.zip*** file is the new replacement file configured with the latest IANA Time Zone information.

#### Step-5 Copy zoneinfo.zip to the Go Time Directory

Copy the newly created zoneinfo.zip file from the scratch directory to the Go time directory.

1. After ensuring you have backup copy, delete the old zoneinfo.zip file from the Go Time Directory.

Delete File: ***$GOROOT/lib/time/zoneinfo.zip***

1. Copy the new zoneinfo.zip file from the scratch directory to the Go Time directory.

Copy:

From: ***D:\tz\zoneinfo.zip***

To: **$GOROOT/lib/time/zoneinfo.zip**

#### After Action Analysis

Unfortunately, there is no version information contained within ***zoneinfo.zip***. So, you will not be able to confirm the IANA version number from an examination of ***zoneinfo.zip***. However, if you correctly updated the ***CODE*** and ***DATA*** variables outlined in Step-3 above, there is high degree of confidence that your new ***zoneinfo.zip*** file contains the latest time zone data.

### Method-2 The Not So Easy Way

This method involves downloading the IANA Time Zone files and manually building the **zoneinfo.zip** file.

#### Step-1 “Safety First”

1. Make a backup copy of the time zone information file:

***$GOROOT/lib/time/zoneinfo.zip.***

1. Create a new, empty scratch directory which can be used for time zone update operations. Example:

***D:\tz.***

#### Step-2 Identify the Latest IANA Time Zone Data Version

#### Point your browser at <https://www.iana.org/time-zones>

#### Make a note of the latest time zone version. Example: **2019c**

#### Step-3 Navigate to Scratch Directory

1. Open a Terminal Window.
2. Make the scratch directory the current directory. On windows this means using Cygwin. Change Directory to scratch directory, ***D:\tz***.

**cd /cygdrive/d**

**cd ./tz**

#### Step-4 Execute Bash Commands

After making the scratch directory (***D:\tz***) the current directory, set the environment and create the sub-directories by issuing the following commands. Again, you must be in the scratch directory (***D:\tz***) when issuing these bash commands.

1. Execute Bash Command #1 - Set Environment to Exit on Error

**set -e**

This sets the environment such that scripts will exit on error.

1. Execute Bash Command #2 - Delete Old ***work*** directory tree

**rm -rf work**

This deletes the sub-directory ***work*** and child directories in the tree.

1. Execute Bash Command #3 - Create ***Work*** Directory

**mkdir ./work**

This creates the sub-directory ***work*** (***D:/tz/work***).

1. Execute Bash Command #4 - Change to ***Work*** Directory

**cd ./work**

Change directory to sub-directory **work (D:/tz/work)**.

1. Execute Bash Command #5 - Create zoneinfo Directory

**mkdir ./zoneinfo**

Creates new sub-directory, ***zoneinfo (D:\tz\work\zoneinfo)***

1. Execute Bash Command #6 - Download Latest Code

Replace the text phrase 2019c in the command syntax below with the latest time zone version acquired in Step-2 above.

**curl -L -O https://www.iana.org/time-zones/repository/releases/tzcode2019c.tar.gz**

This **curl** command must be executed on one line from the **work** directory ***(D:\tz\work)***.

1. Execute Bash Command #7 - Download Latest Data

Replace the text phrase 2019c in the command syntax below with the latest time zone version acquired in Step-2 above.

**curl -L -O https://www.iana.org/time-zones/repository/releases/tzdata2019c.tar.gz**

This **curl** command must be executed on one line from the **work** directory (***D:\tz\work***).

1. Execute Bash Command #8 - Unzip Code tar

Replace the text phrase **2019c** in the command syntax below with the latest time zone version acquired in Step-2 above. This command will unzip the file downloaded with Command # 6, above.

**tar xzf tzcode2019c.tar.gz**

This command must be executed on one line from the **work** directory **(D:\tz\work)**.

1. Execute Bash Command #9 - Unzip Data tar

Replace the text phrase 2019c in the command syntax below with the latest time zone version acquired in Step-2 above. This command will unzip the file downloaded with Command # 7, above.

**tar xzf tzdata2019c.tar.gz**

This command must be executed on one line from the **work** directory **(D:\tz\work)**.

1. Execute Bash Command #10 - Build Time Zone Files

This will execute **make** command and create the actual time zone data files.

**make CFLAGS=-DSTD\_INSPIRED AWK=awk TZDIR=zoneinfo posix\_only**

This command must be executed on one line from the **work** directory **(D:\tz\work)**.

1. Execute Bash Command #11 - Change Directory to zoneinfo

Change directory to ***D:\tz\work\zoneinfo***

**cd ./zoneinfo**

If uncertain about your current directory, run bash command, **pwd**. This will display the current directory.

It is important to be in the correct directory.

1. Execute Bash Command #12 - Delete Old zoneinfo.zip files

As a precaution, this command is run from ***D:\tz\work\zoneinfo***. It will effectively delete old ***zoneinfo.zip*** files which reside in directory ***D:\tz***, two directories above the current directory. The new ***zipinfo.zip*** file will be created in ***D:\tz***.

**rm -f ../../zoneinfo.zip**

1. Execute Bash Command # 13 - Zip the **zipinfo** Directory

**zip -0 -r ../../zoneinfo.zip \***

**“-0”** (Zero) option = “store files with no compression”

This zip command will create the ***zoneinfo.zip*** file containing the specified time zone information downloaded in Commands # 6 and 7, above.

1. Execute Bash Command # 14 - Change Directory to **D:\tz**

**cd ../..**

This assumes that the change directory command is being executed from directory, **D:\tz\work\zoneinfo**. After executing this “change directory” command, the current working directory should be ***D:\tz***. If in doubt about the current directory, issue the ***pwd*** command to list the current working directory.

1. Bash Command Wrap-Up

This concludes the bash commands required to create the new ***zoneinfo.zip*** file containing the time zone information downloaded in Command # 6 and 7. If all steps were completed successfully, the new ***zipinfo.zip*** file resides in the base scratch directory, ***D:\tz***.

The following involve copying this zipinfo.zip file to the Go time directory. After completing this operation, consider taking action to clean up scratch directory ***D:\tz***.

#### Step-5 Copy zoneinfo.zip to the Go Time Directory

Copy the newly created ***zoneinfo.zip*** file from the scratch directory to the Go time directory.

c. After ensuring you have backup copy, delete the old zoneinfo.zip file from the Go Time Directory.

Delete File: $GOROOT/lib/time/zoneinfo.zip

d. Copy the new zoneinfo.zip file from the scratch directory to the Go Time directory.

Copy:

From: D:\tz\zoneinfo.zip

To: $GOROOT/lib/time/zoneinfo.zip

After Action Analysis

Unfortunately, there is no version information contained within zoneinfo.zip. So, you will not be able to confirm the IANA version number from an examination of zoneinfo.zip. However, if you correctly updated the CODE and DATA variables outlined in Step-3 above, there is high degree of confidence that your new zoneinfo.zip file contains the latest time zone data.

1. Close the Terminal Window
2. Assuming a successful bash script execution, only two files should remain in the scratch directory:
3. **update.bash**
4. **zoneinfo.zip**

This ***zoneinfo.zip*** file is the new replacement file configured with the latest IANA Time Zone information.

#### Step-5 Copy zoneinfo.zip to the Go Time Directory

Copy the newly created zoneinfo.zip file from the scratch directory to the Go time directory.

1. After ensuring you have backup copy, delete the old zoneinfo.zip file from the Go Time Directory.

Delete File: ***$GOROOT/lib/time/zoneinfo.zip***

1. Copy the new zoneinfo.zip file from the scratch directory to the Go Time directory.

Copy:

From: ***D:\tz\zoneinfo.zip***

To: **$GOROOT/lib/time/zoneinfo.zip**

#### After Action Analysis

Unfortunately, there is no version information contained within ***zoneinfo.zip***. So, you will not be able to confirm the IANA version number from an examination of ***zoneinfo.zip***. However, if you correctly updated the ***CODE*** and ***DATA*** variables outlined in Step-3 above, there is high degree of confidence that your new ***zoneinfo.zip*** file contains the latest time zone data.

## Cygwin Setup

### Start Up Command

C:\cygwin64\bin\mintty.exe -i /Cygwin-Terminal.ico –

You can also use the [ConEmu](#_ConEmu_Configured_for) terminal discussed below.

### Change Directories to D Drive

cd /cygdrive/d

cd ./TimeZones

### ConEmu Configured for Cygwin

ConEmu now has a task named Cygwin.

## tz Database Site

<https://www.iana.org/time-zones>

[TimeZoneInfo](http://www.internetassignednumbersauthority.org/time-zones)

The tz or time zone database (aka zoneinfo database) can be acquired from the [INA site](http://www.internetassignednumbersauthority.org/time-zones) shown above. The time zone database arguably contains the most accurate international time zone information on the planet.

Note: The code below will ftp and download the latest version of the database automatically. However, you also have the option of downloading the code and data which will allow you to build the zoneinfo.zip file from this site.

## ReadMe File

This is the README file that typically accompanies the tz database. Be sure to read the latest versions for the commands necessary to build the zoneinfo.zip aka Time Zone database.

### README for the tz distribution

"What time is it?" -- Richard Deacon as The King

"Any time you want it to be." -- Frank Baxter as The Scientist

(from the Bell System film "About Time")

The Time Zone Database (often called tz or zoneinfo) contains code and data that represent the history of local time for many representative locations around the globe. It is updated periodically to reflect changes made by political bodies to time zone boundaries, UTC offsets, and daylight-saving rules.

Here is a recipe for acquiring, building, installing, and testing the tz distribution on a GNU/Linux or similar host.

mkdir tz

cd tz

wget --retr-symlinks 'ftp://ftp.iana.org/tz/tz\*-latest.tar.gz'

gzip -dc tzcode-latest.tar.gz | tar -xf -

gzip -dc tzdata-latest.tar.gz | tar -xf -

Be sure to read the comments in "Makefile" and make any changes needed to make things right for your system, especially if you are using some platform other than GNU/Linux. Then run the following commands, substituting your desired installation directory for "$HOME/tzdir":

make TOPDIR=$HOME/tzdir install

$HOME/tzdir/etc/zdump -v America/Los\_Angeles

Historical local time information has been included here to:

* provide a compendium of data about the history of civil time that is useful even if not 100% accurate;
* give an idea of the variety of local time rules that have existed in the past and thus an idea of the variety that may be expected in the future;
* provide a test of the generality of the local time rule description system.

The information in the time zone data files is by no means authoritative; fixes and enhancements are welcome. Please see the file CONTRIBUTING for details.

Thanks to these Time Zone Caballeros who've made major contributions to the time conversion package: Keith Bostic; Bob Devine; Paul Eggert; Robert Elz; Guy Harris; Mark Horton; John Mackin; and Bradley White. Thanks also to Michael Bloom, Art Neilson, Stephen Prince, John Sovereign, and Frank Wales for testing work, and to Gwillim Law for checking local mean time data.

Thanks in particular to Arthur David Olson, the project's founder and first maintainer, to whom the time zone community owes the greatest debt of all.

None of them are responsible for remaining errors.

Look in <ftp://ftp.iana.org/tz/releases/> for updated versions of these files.

Please send comments or information to tz@iana.org.

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This file is in the public domain, so clarified as of 2009-05-17 by Arthur David Olson. The other files in this distribution are either public domain or BSD licensed; see the file LICENSE for details.

## Create zoneinfo.zip

1. Download and unzip the make files:

mkdir tz

cd tz

wget --retr-symlinks 'ftp://ftp.iana.org/tz/tz\*-latest.tar.gz'

gzip -dc tzcode-latest.tar.gz | tar -xf -

gzip -dc tzdata-latest.tar.gz | tar -xf -

1. Be sure to read the comments in "Makefile" and make any changes needed to make things right for your system.

Substitute your timezone in the following line:

From: LOCALTIME= GMT

To: LOCALTIME= America/Chicago

1. Everything gets put in subdirectories of. . .

From: TOPDIR= /usr/local

To: TOPDIR= /cygdrive/d/TimeZoneDb

1. Issue the Make Command:

make TOPDIR=/cygdrive/d/TimeZoneDb/TimeZoneDb12 install

/cygdrive/d/TimeZoneDb/TimeZoneDb12/usr/bin/zdump -v America/Los\_Angeles

1. These commands will create the following directory:

D:\TimeZoneDb\TimeZoneDb12\usr\share\zoneinfo

1. Now create a zip file containing the zoneinfo directory shown in Step # 5 above.

* cd zoneinfo – Change directory to the zoneinfo directory
* Execute bash script

zip -0 -r ../../zoneinfo.zip \*

* The zoneinfo.zip will be copied two directories up from zoneinfo directory.
* You can open the zoneinfo.zip file in WinRar.
* OS = Unix
* No Compression – Original size = compressed size.

1. Finally, copy the new zoneinfo.zip file to the Go lib directory:

C:\Go\lib\time

## func LoadLocation

The Go Time Package contains a function named [LoadLocation](http://golang-jp.org/pkg/time/#LoadLocation). This function is used to load

func LoadLocation(name string) (\*Location, error)

LoadLocation returns the Location with the given name.

If the name is "" or "UTC", LoadLocation returns UTC. If the name is "Local", LoadLocation returns Local.

Otherwise, the name is taken to be a location name corresponding to a file in the [IANA Time Zone database](http://www.internetassignednumbersauthority.org/time-zones), such as "America/New\_York".

The time zone database needed by LoadLocation may not be present on all systems, especially non-Unix systems. LoadLocation looks in the directory or uncompressed zip file named by the ZONEINFO environment variable, if any, then looks in known installation locations on Unix systems, and finally looks in $GOROOT/lib/time/zoneinfo.zip.

CODE=2019c

DATA=2019c

curl -L -O <https://www.iana.org/time-zones/repository/releases/tzcode2019c.tar.gz>

curl -L -O <https://www.iana.org/time-zones/repository/releases/tzdata2019c.tar.gz>

tar xzf tzcode2019c.tar.gz

tar xzf tzdata2019c.tar.gz

1. Be sure to read the comments in "Makefile" and make any changes needed to make things right for your system.

Substitute your timezone in the following line:

From: LOCALTIME= GMT

To: LOCALTIME= America/Chicago

1. Everything gets put in subdirectories of. . .

From: TOPDIR= /usr/local

To: TOPDIR= /cygdrive/d/TimeZoneDb