

CART User Guide

1.0 Overview

CART (Complete Automated Regression Tester) is an independent project from VCKK. CART is used to test VCKK.

The official backup for CART source code is Git Hub. (@ <https://github.com/victortimothyshulist/cart>). It is on Github unencrypted.

VCKK however, is backed up on Google Drive and IS encrypted.

Since CART is its own project but it is required to exist inside VCKK home directory, copy cart.py from its own directory into VCKK directory. (Make sure that ./vckk/cart.py is updated and matches /cart/cart.py).

```
cp /home/victor/cart/cart.py /home/victor/vckk/
```

2.0 How it works

VCKK can be invoked and executed in two modes:

- Mode 1 : NOT running under CART
- Mode 2: running under CART.

In Mode 1, you run vckk.py by just calling it as:

```
cd vckk
cd ./vckk.py
```

When it is run this way, TESTING is set to False. When it is False, vckk.py reads input from the console (keyboard) and responds to the screen. But in Mode 2, CART creates a temporary version of vckk, and calls it. Then TESTING is True. When true, vckk.py does not read from keyboard input, but from a file (a file that CART creates).

For a given version of VCKK, say version 1.000, you create a configuration file.

As an example, for version 1.000, you would create a file in...

`./testpackages/v1.000.conf`

This file contains the list of input strings to process. It also contains the names of the compressed tar ball files that contain 'state' to process each input string under. The 'state' is the directories and files for VCCK to operate under, for each input. These directories for example are...

`./conversation-history/`

`./sessions/`

`./tls_csv/`

`./interpretations/`

`./compiled-classes/`

So that, if you test the processing of input string 'x' a year ago, with specific compiled-classes and conversation-history, you know that every time you run it in the future, it will run under the same circumstances ('state' – files in the above directories).

So, if you run CART for say v1.000, CART will decompress the files in

`testpackages/files/v1.000/`

and run each input listed in `testpackages/v1.000.conf`.

There are 2 modes you run CART in...

- Mode 1 : '**create**' mode. In this mode you are **establishing** what the expected results are for processing each line in your *.conf file ('v1.000.conf' in this example). In mode 1, VCCK creates `/home/victor/cart/testpackages/files/v1.000/v1.000.tar.gz`. Let's say you just coded version 1.000, and all test cases pass, let's say this is June 01, 2020. In mode 1, `testpackages/files/v1.000/v1.000.tar.gz` is **created**. (in mode 2, it is not created, but compared to the results produced in `results_cart_tests`).
- Mode 2 : 'test' mode. In mode 1 your expected results file was created. In Mode 2, let's say you have just coded version 2.000. Well, before you even

start developing the test cases for version 2.000, you want to make sure you didn't break any v1.000 functionality. So, first you re-run the tests for v1.000. You do this in Mode 2 ... where CART runs VCCK with all tests for v1.000 and the output goes into

/home/victor/vcck/results_cart_tests

Let's say you just coded version 2.000 and it is June 01, 2022. Well, you coded v1.000 two years ago !! SO, did the new code you added to vcck.py (which provides version 2.000 functionality), did that new code of v2.000 break the version 1.000 code? Well, the output produced in

/home/victor/vcck/results_cart_tests (from test results in 2022 ('just now'))

on June 01, 2022, is compared with the expected results for v1.000 from 3 years ago (the file

/home/victor/cart/testpackages/files/v1.000/v1.000.tar.gz – test results from 3 years ago). CART decompresses that tar.gz file and compares it to results in

/home/victor/vcck/results_cart_tests

any mismatch at all in contents results in 'regression test failed' ! Error message appearing on screen.

3.0 Example of using cart for version 1.000 and 2.000 of VCCK

Let's say we just coded version 1.000. So, we develop the test cases, and then create the v1.000.conf file. You create **testpackages/v1.000.conf**

let's say it has this for contents....

```
# CART test package file for version 1.000.
areas = red, green, blue

[state.1.tar.gz]

"input A"
"input B"

[state.2.tar.gz]

"my line X"
"my line Y"

[state.3.tar.gz]

"my line A"
"my line B"
```

After creating all your 'state' files/folders (any state files that VCCK depends on, example, ./conversation-history/, ./sessions/,

./tls_csv/, ./interpretations/ and ./compiled-classes/) you would figure out the inputs for vcck to process while it is in that 'directory state'. If all tests pass, then create a tar.gz file for all those state files, and call it (in this example, "state.1.tar.gz").

So state.1.tar.gz will contains all 'state' files/folders (./interpretations/* ,etc).

Then put that file (state.1.tar.gz) in ./testpackages/files/v1.000/ directory.

Now, CART (in this example) will have VCCK process the LUI, for each input (in this example ("input A" and "input B").

VCCK's output (from '**cartlog()**' output, discussed later), will be produced in **results_cart_tests** (and, if in '**create**' mode, ./cart/testpackages/files/v1.000/v1.000.tar.gz).

If all tests pass, testpackages/files/v1.000/v1.000.tar.gz will not ever change (and it will be used to compare to, years in future). So we ran in 'create' mode and that tar.gz file was created, say it's the year 2020.

To have testpackages/files/v1.000/v1.000.tar.gz created, run this...

./cart.py v1.000 create

after running that, testpackages/files/v1.000/v1.000.tar.gz is created.

Now, years later, say you're on version 15.0 of VCCK. Well, we want to re-test all previous versions (under the exact same directory state as we did years ago).

Now, we run CART not in 'create' mode, but 'test' mode.

In '**test**' mode ./testpackages/files/v1.000/v1.000.tar.gz is **NOT** created, but it is assumed to already exist (and CART will error out if it does not exist).

In **test** mode, CART will run VCCK and the output ("now" - say we are in the year 2035). Now, the output from VCCK is produced in **results_cart_tests**. So, now, in test mode in year 2035 (test mode for v1.000), CART decompresses testpackages/files/v1.000/v1.000.tar.gz (that was made 15 years ago), with the latest output (that is in **results_cart_tests**). Any differences result in 'regression test ' failed ! Message appearing.

The command to do this is...

`./cart.py v1.000 test`

so when CART is run as in the above, it does ****NOT**** create the testpackages/files/v1.000/v1.000.tar.gz file, but instead just compares the output (that VCKK produced) in results_cart_tests with the results that are stored in the tar.gz file (from 15 years ago,), in testpackages/files/v1.000/v1.000.tar.gz.

When CART is run in '**create**' mode, the file testpackages/files/v1.000/v1.000.tar.gz is created. In CREATE mode, the contents of that tar.gz file are identical to the non-compressed data in **results_cart_tests** directory so that you can easily look at the output without having to manually decompress the tar.gz. (They are the same because right after data is produced in **results_cart_tests**, CART creates v1.000.tar.gz from the contents in **results_cart_tests**).

But, in '**test**' mode, the data in **results_cart_tests** may or may not be the same as what is in v1.000.tar.gz. In test mode, v1.000.tar.gz is NOT created (but instead just consulted – in test mode, v1.000.tar.gz was created years ago), but **results_cart_tests** was produced 'just now' (the current test run). If the two compare perfectly, then regression test pass, if they differ at all even in slightest way, regression test is reported as failing.

calls to "cartlog()". The first argument to cartlog has to be a string. That first string argument MUST BE exactly, one of the "areas" given in your configuration file. The second argument is also a string – and it is whatever test results you want to record.

Looking at the configuration file again, (for a specific version –one *.conf file per version).

[state.1.tar.gz]

"input A"

"input B"

[state.2.tar.gz]

"my line X"

"my line Y"

This tells CART.... (IF run with `./cart.py v1.000 create`)....

1. Decompress the tar.gz in /home/victor/vcck/testpackages/files/v1.000/state.1.tar.gz into the root of ./vcck directory.

2. then, have VCCK execute the inputs

"input A" and then "input B" (set "lui" variable to each one of those, one at a time).

Then vcck.py calls "cartlog()" to report testing output (which ends up in results_cart_tests).

Then, CART cleans up the directory (gets rid of all files from decompressing state.1.tar.gz.

Then CART decompresses state.2.tar.gz, and then directs VCCK to process the "last user input" (lui) values of... "my line X" and "my line Y"

again, output going into results_cart_tests. (output goes into results_cart_tests when vcck.py calls cartlog() – discussed below.

Question --- How does output from VCCK make it into **results_cart_tests** ? (and, IF in 'create' mode, into v1.000.tar.gz)?

Answer – by VCCK calling cartlog()

OK, so , how does VCCK call cartlog() ?

Question --- what is cartlog() for ?

Cartlog() --- is the means for VCCK to report the test output.

Question – how to call cartlog() ? (areas-- what is that?)

**** NO actual executable Python code for CART testing is ever actually put into vcck.py.**

The only thing that is done is insertions of comments into vcck.py.

Example...

```
#CART_INCLUDE_v1.000_file1.py
```

if you have that comment in your vcck.py source code, it would cause CART to (as part of its creation of a temporary version of vcck.py)... to...

look into (IF you were running for version 1.000)...

look into... testpackages/files/v1.000 to find a file "file1.py".

The above comment line would be replaced with all the lines in testpackages/files/v1.000/file1.py.

This is very clean – because the only change made to your actual VCCK source code is the addition of Python comments !!!

If you were testing another version, say v2.500, and you wanted to include testing file 'myfile.py', then you would create

```
testpackages/files/v2.500/myfile.py
```

then, at the appropriate place inside vcck.py, have a comment....

```
#CART_INCLUDE_v2.500_myfile.py
```

then, ONLY **IF** you ran CART with...

```
./cart.py v2.500 create
```

then and only then would the comment line

```
#CART_INCLUDE_v2.500_myfile.py
```

be replaced with all lines from

```
testpackages/files/v2.500/myfile.py
```

if you ran for another version (example "**./cart.py v3.500 create**"), then it would leave the comment line

```
#CART_INCLUDE_v2.500_myfile.py
```

alone.

So, in the above, the file "myfile.py" is called a "CART Include File".

What does a CART Include File contain?

It contains calls to "cartlog()".

Let's say you wanted to produce the results of doing a "pick highest" functionality. So you want VCCK to report the results of it doing that. So, first you'd create a file, maybe called "pickh.py". (short for pick highest). Maybe there's a python function "def pick_highest" that we are testing.

So, inside vcck.py, right after calling the function, we put a include....

```
pick_highest()
```

and then add your comment...

```
pick_highest()
#CART_INCLUDE_v5.690_pickh.py
```

this example says we are testing version 5.690 of VCCK. (so in order for this include to actually be replaced by contents of pickh.py file, you'd have to run "**./cart.py v5.690 create**").

Now, create the file

```
./testpackages/files/v5.690/pickh.py
```

now, the contents of that file would be, for example...

```
for thevalue in somelist:
    cartlog(pickhighest, thevalue)
```

So we are saving all the values in the Python list variable "somelist" to the CART results directory,

in a file called "pickhighest".

However, in order for this to work, you have to Define the "area" inside

```
./testpackages/v5.690.conf.
```

Inside the /testpackages/v5.690.conf you would have to have a line....

```
areas = pickhighest
```

(and whatever other areas you want, comma separated).

What are areas?? they are functionalities you want tested. The idea is to logically separate (into files), all results for one feature or perhaps one function, in the same file.

The two modes VCKK is called...

Mode 1:

CART calls vcck.py (well, it makes a copy of vcck.py and creates a temporary version of it (called ./vcck-cart-temp.py) that is same as vcck.py except with the CART include comments replaced by the actual cart include files (which live in testpackages/files/v1.000 directory – or whatever version).

>> Example calling from CART...

```
./vcck-cart-temp.py -T 0:temp_cart_input.txt
```

When called this way, VCKK only gets input to process (user input strings) from a file that CART dynamically creates for that test run. VCKK does NOT read in keyboard input for strings to process. This is when VCKK is run in "Testing mode"

Mode 2:

when called as in...

```
./vcck.py
```

Then VCKK reads strings to process from keyboard input only. NOT from a file. This is the "normal mode", or "production mode".

5.0 Important Note about calling cartlog()

When calling cartlog()... do **NOT** write the output like this....

```
For x in var_1:
    cartlog(somearea, "x = " + x)
    for y in var_2[x]:
        cartlog(somearea, "\t" + "y = " + y)
```


Instead, have **EVERY LINE** COMPLETELY qualified....

```
For x in var_1:
    for y in var_2[x]:
        cartlog(somearea, "x = " + x + ", y = " + y)
```

This is so that, after CART sorts all output files in results_cart_tests, that the diff will work.

So again, we will **NOT** require that you sort before calling cartlog() --- nothing in your testpackages NOR vcck.py should care about sorting.. CART will do all sorting before comparing last run with previous expected results file.

Calls to cartlog() should, EVERY TIME, have ALL relevant values of variables that pertain to that test, right from the "main call" (from code that is in "main" – that is, outside any other function). Every call to cartlog() should include ALL relevant variable values and never exclude the value of any parent variables. The only exceptions are: (1) the directory state database ID and (2) index into "LUI" number... in other words, the 2 directories right under results_cart_tests.

The results_cart_tests directory

If you had the following in your *.conf file. (testpackage configuration file)... (only one area defined but can be more, comma separated)...

```
areas = myarea_1
```

```
[state1.tar.gz]
"xxx"
"yyy"
```

```
[state2.tar.gz]
"jjj"
"kkk"
```

Then if you ran CART in **create** mode, you look inside our **results_cart_tests** directory...

first directory under **results_cart_tests** is the directory state ID, and second directory is the input number....

results_cart_tests/0/0/myarea_1.res

this is data that is sent via `"cartlog(' myarea_1',)`

This is for when the directory state is as inside the `state1.tar.gz` file (after CART uncompresses this file into the root of `vcck`, then runs input # 0, `"xxx"`).

results_cart_tests/0/1/myarea_1.res

same as above but when `"yyy"` is processed (the `"1"` in `"/0/1/"` of the path... index 1... or 2nd input line (`"yyy"`)...

results_cart_tests/1/0/myarea_1.res

here the first directory under **results_cart_tests** is `"1"` .. which means index 1.. or 2nd directory state (`state2.tar.gz`)... and `/0/` in path means index 0.. or 1st input line (`"jjj"`). So this is all the output of `'cartlog('myarea_1',.....)'` when under that state of directories and files, and that input. (first.. or index 0.. `'jjj'`)

results_cart_tests/1/1/myarea_1.res

same as above... first `'/1/'` in path means under directory state given by contents of `state2.tar.gz`, and Second `/1/` means input index 1 (== 2nd ---> `"kkk"`).

Unknown Bug

we were not able to reproduce the following bug... but there is a work around.

Running `vcck.py` was totally fine. However, running it from CART caused a runtime error.

When CART would create and then run `'vcck-cart-temp.py'`, there was a Key error.

When we looked into it, it was found that there was no actual issue with `vcck-cart-temp.py` itself BUT instead, the VCKK knowledge base directories became corrupt... I mean the directory

`/home/victor/vcck/tls_csv/0000000000`

contained a template that had 2 VNAVs. Which was correct. **BUT** there was a `lvnavs.data` and a `cvnavs.data` file... which is okay.. **BUT** one of those files had a SINGLE column of data whereas another one had TWO columns of data. So of course `./vcck-cart-temp.py` choked on that !

No idea right now if it was :

- a) a parsing issue (probably not)
- b) two templates somehow ended up in the same directory. One template that had 2 vnavs and another template that had only one vnav..

no idea right now how we can even reproduce this issue. **BUT** for now, if you get an error where CART runs vcck-cart-temp.py and ends in a crash, well, run clearkb.bsh first.

clearkb.bsh does this..

```
rm -rf conversation-history/  
rm -rf sessions/  
rm -rf tls_csv/  
rm -rf interpretations/  
rm -rf compiled-classes/
```

when we did this, everything worked again and vcck-cart-temp.py' was no longer crashing.