# Tcl 9 - What about extensions and distributions?

Tcl extensions are an essential part of the Tcl/Tk eco system.

Let's start with a few questions:

1. Who uses pure Tcl/Tk, i.e. no extensions?

2. Who uses 1 - 5 extensions?

3. Who uses more than 5 extensions?

My swiss-knife toolset poApps uses
the following 13 extensions:

```
cawt pawt scrollutil tcllib tablelist
Img tdom tclMuPdf fitsTcl poImg twapi tkdnd tksvg
```
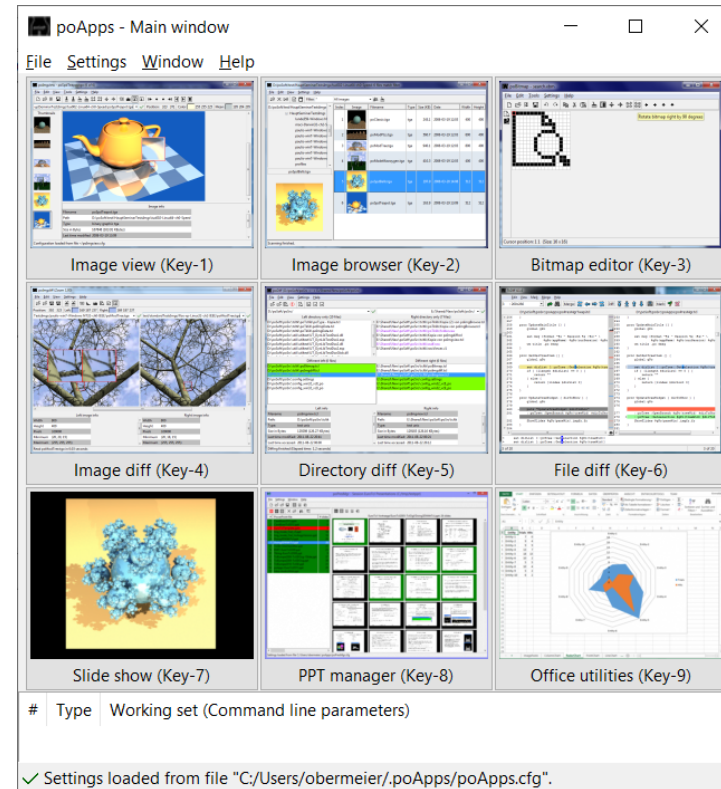
With Tcl/Tk 9 approaching its final release soon, there is still lots of work to be done with regard to the Tcl eco system:
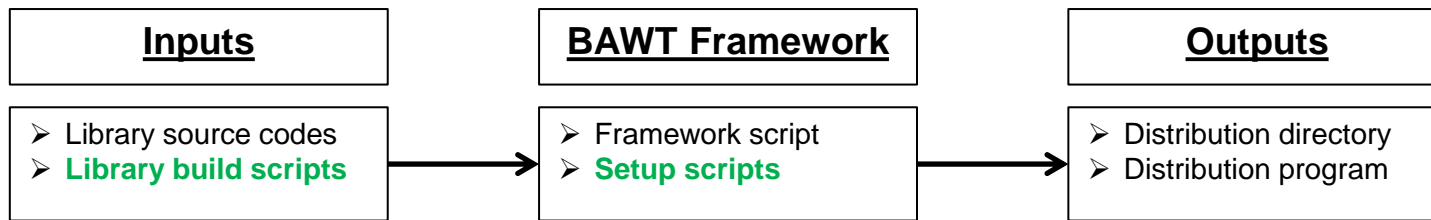
- Porting extensions to Tcl 9.
- Ideally: Establish an extension repository with source and binary distributions.

To start discussion and hopefully get developers on board, this talk covers the following topics:

- **Overview and current status of BAWT**

- **State of extension porting to Tcl/Tk 9**

- **Handling of extension source code and dependencies**

- BAWT allows the automatic building of C/C++ libraries and tools on several platforms (Windows, Linux, Mac, …).
- BAWT allows the automatic building of Tcl/Tk, Tcl extensions and Tclkits on several platforms (Windows, Linux, Mac, …).
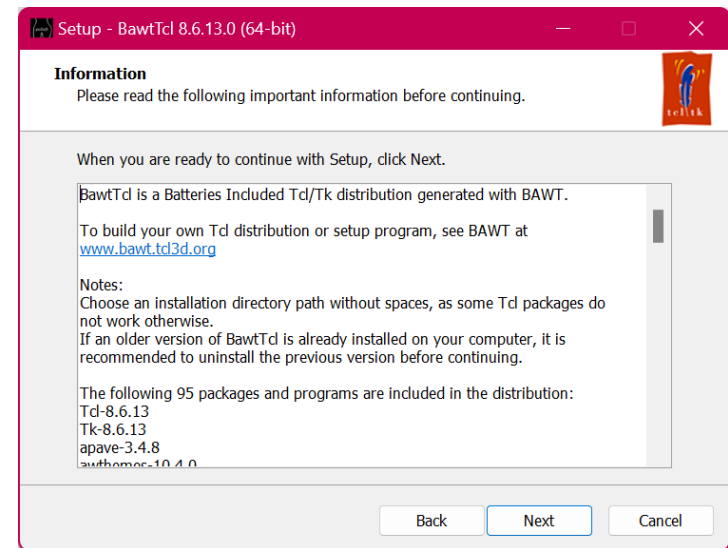
Inputs	**BAWT Framework**	**Outputs**
➢ Library source codes ➢ **Library build scripts**	➢ Framework script ➢ **Setup scripts**	➢ Distribution directory ➢ Distribution program

BAWT - Build scripts

Build files are standard Tcl script files.
Build files include the logic needed to extract, configure, compile and distribute a library.

```tcl
proc Init_udp { libName libVersion } {
    SetScriptAuthor     $libName "Paul Obermeier" "obermeier@tcl3d.org"
    SetLibHomepage      $libName "https://sourceforge.net/projects/tcludp/"
    SetLibDependencies  $libName "Tcl"
    SetPlatforms        $libName "All"
    SetWinCompilers     $libName "gcc"
}

proc Build_udp { libName libVersion buildDir instDir devDir distDir } {
    if { [UseStage "Extract" $libName] } {
        ExtractLibrary $libName $buildDir
    }

    if { [UseStage "Configure" $libName] } {
        set cflags ""
        if { [GetMajor [GetGccCompilerVersion]] >= 14 } {
            append cflags "CFLAGS=\"-fpermissive\" "
        }
        TeaConfig $libName $buildDir $instDir $cflags
    }

    if { [UseStage "Compile" $libName] } {
        MSysBuild $libName $buildDir "install-binaries"
    }

    if { [UseStage "Distribute" $libName] } {
        StripLibraries "$instDir"
        LibFileCopy "$instDir"  "$devDir/[GetTclDir]"   "*"  true
        LibFileCopy "$instDir"  "$distDir/[GetTclDir]"  "*"  true

    }
    return true
}
```

Bootstrap

Setup

Clean

Extract

Configure

Compile

Distribute

Finalize
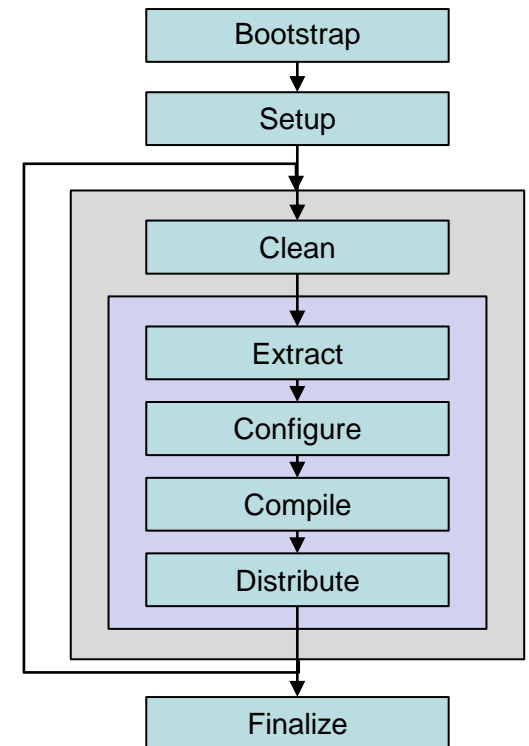
BAWT - Setup files

Setup files are standard Tcl script files. They must have one or more calls to the ***BAWT*** *Setup* procedure for each library being built. Optionally one or more calls to the ***BAWT*** *Include* procedure can be specified to add dependent libraries.

```
# Builds Tcl/Tk packages which depend on 3rd party libraries,
# like SWIG, CMake, libressl or image libraries.

Include "Tools.bawt"
Include "BasicLibs.bawt"
Include "Tcl_Basic.bawt"
Include "Tcl_Python.bawt"

# Setup  LibName          ZipFile                      BuildFile              BuildOptions
Setup   mawt             mawt-0.4.4.7z                 mawt.bawt
Setup   tcl3dBasic       tcl3d-1.0a1.7z                tcl3dBasic.bawt
Setup   OglInfo          tcl3d-1.0a1.7z                OglInfo.bawt

…

# MuPDF (and therefore dependent libraries tclMuPdf and MuPDFWidget)
# are not available with VisualStudio < 2017.
if { ( [UseVisualStudio "primary"] && [GetVisualStudioVersion] < 2017 ) || \
       ! [IsGccCompilerNewer "4.8.5"] } {
    Setup   mupdf          mupdf-1.18.2.7z               mupdf.bawt
    Setup   tclMuPdf       tclMuPdf-2.1.1.7z             tclMuPdf.bawt
} else {
    Setup   mupdf          mupdf-1.21.1.7z               mupdf.bawt              NoDarwin-arm
    Setup   tclMuPdf       tclMuPdf-2.3.1.7z             tclMuPdf.bawt           NoDarwin-arm
}
```

BAWT - Setup files

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The following standard *Setup* files are currently available.
It is easy to create your own *Setup* file according to your needs.
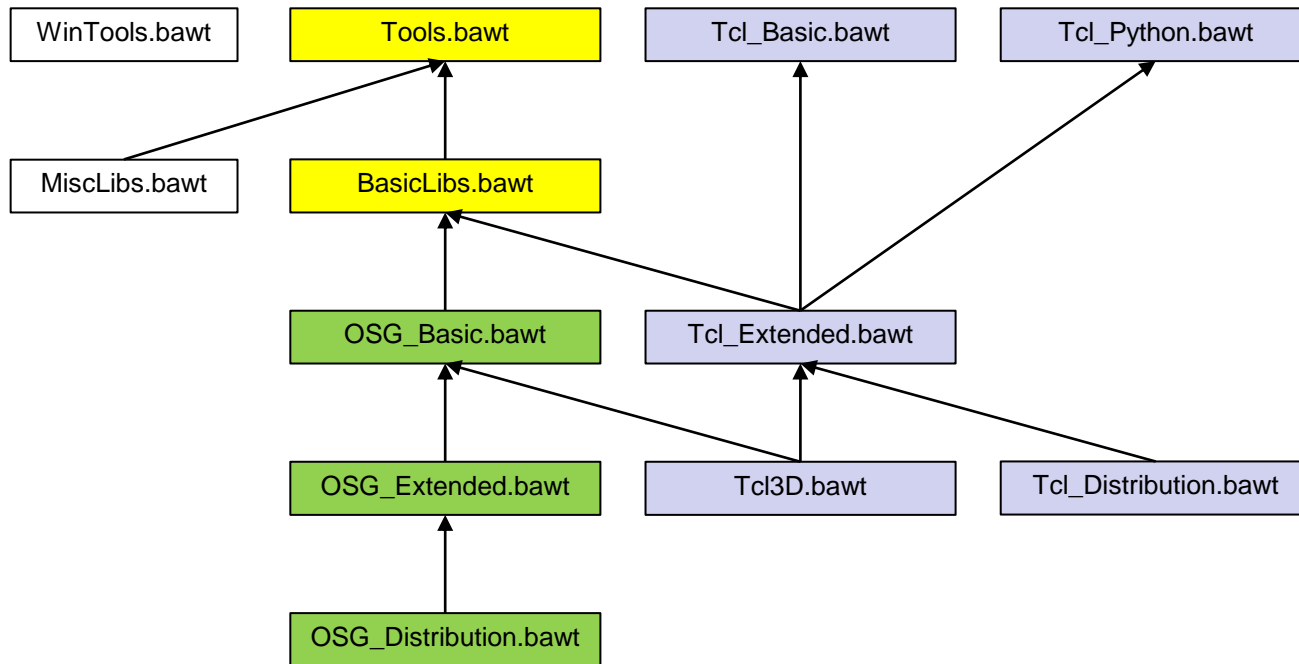
BAWT - Dependencies

Library dependencies are specified in *Build* scripts using proc SetLibDependencies.
Library versions are specified in *Setup* scripts using proc Setup.

List of all libraries using command line option --dependencies.

```
#: Name               Version   Dependencies
---------------------------------------------------------------------------
  1: apave             4.4.5    Tk
  2: awthemes          10.4.0   Tk
  3: BawtLogViewer     2.4.0    Tclkit tablelist tkdnd poLibs scrollutil Img
  4: Blender           3.0.0
  5: Boost             1.75.0
  6: BWidget           1.9.17   Tk
  7: Cal3D             0.120    CMake freeglut
  8: Canvas3d          1.2.3    Tk
  9: cawt              2.9.6    Tcl twapi
 10: ccl               4.0.6    CMake
 11: cffi              1.2.1    Tcl libffi
 12: cfitsio           4.1.0
 13: CMake             3.25.2
 14: critcl            3.2.1    Tcl
 15: curl              7.70.0   libressl
 16: DiffUtil          0.4.3    Tcl
 17: DirectXTex        2021_11
 18: Doxygen           1.8.15
 19: Eigen             3.3.9
 20: expect            5.45.4   Tcl
 21: Ffidl             0.9.1    Tcl libffi
 22: ffmpeg            4.4.4    yasm SDL
 23: fftw              3.3.9
 24: fitsTcl           2.5.1    Tcl cfitsio
…
```

BAWT - Summary

BAWT is available from https://www.tcl3d.org/bawt

Current version is 2.3.1 from 2023/01/19.

New Version 2.4.0 in work supporting Tcl 8.6.14 and Tcl 9.

Tclkits for bootstrapping are available for the following platforms:

      tclkit-Darwin64

      tclkit-Darwin-arm64

      tclkit-Linux32

      tclkit-Linux64

      tclkit-Linux-arm32

      tclkit-Linux-arm64

      tclkit-Linux-riscv64

      tclkit-win32.exe

Porting experiences

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Migrating scripts to Tcl 9
https://core.tcl-lang.org/tcl/wiki?name=Migrating%20scripts%20to%20Tcl%209

Migrating C extensions to Tcl 9
https://core.tcl-lang.org/tcl/wiki?name=Migrating%20C%20extensions%20to%20Tcl%209

Porting extensions to Tcl 9
https://wiki.tcl-lang.org/page/Porting+extensions+to+Tcl+9

Porting tcllib to Tcl 9
https://openacs.org/conf2023/info/download/file/porting-tcllib-tcl9.pdf

Moving to Tcl 9.0
https://aplsimple.github.io/en/tcl/misc/movetcl90.html

Porting tools: tcl9-migrate for Tcl scripts

This software is intended to help identify changes needed for migrating Tcl 8 scripts to Tcl 9.

It has two modes of operation:
- a static analyzer based on Nagelfar that runs under both Tcl 8.6 and 9 logging warnings for potential incompatibilities.
- a runtime analyzer. This is intended to only run under Tcl 9. It attempts to fix up invalid code (e.g. encodings, tilde references) at run time allowing the program to continue to run but logs warnings to stderr.

Ashok P. Nadkarni

https://github.com/apnadkarni/tcl9-migrate

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Tcl script to find all occurrences of Tcl C functions using `Tcl_Size` as
- Return value
- Input parameter
- Output parameter

Paul Obermeier

https://wiki.tcl-lang.org/page/Tcl+9+functions+using+Tcl%5FSize

```
➢ tclsh FindTclSizeFuncs.tcl ..\Tcl9-TclSize-Pkgs\tcltls-1.7.23

D:/Exchange/Tcl9/Tcl9-TclSize-Pkgs/tcltls-1.7.23/tclOpts.h
  Tcl_GetByteArrayFromObj
  Tcl_GetStringFromObj
D:/Exchange/Tcl9/Tcl9-TclSize-Pkgs/tcltls-1.7.23/tls.c
  Tcl_EvalEx
  Tcl_GetStringFromObj
…
Tcl_EvalEx
Tcl_GetByteArrayFromObj
Tcl_GetStringFromObj
Tcl_ListObjGetElements
Tcl_NewListObj
Tcl_NewStringObj
…
```

Package	Responsible	Comments
SWIG	[PO]	
apave	[aplsimple]	
BWidget	[oehhar]	Repository version working. No official release yet.
cawt	[PO]	Needs Twapi 5.0 for Tcl 9.
cffi	[APN]	
critcl	[AK]	Repository version working. No official release yet.
Img	[PO]	
iocp	[APN]	Version 2.0a0 available.
itk	core.tcl-lang.org	
mawt	[PO]	
mentry	[nemethi]	
nsf	[Gn]	Repository version working. No official release yet.
ooxml	[ALX]	
pawt	[PO]	
pdf4tcl	[Peter Spjuth]	
poApps	[PO]	
poImg	[PO]	
ruff	[APN]	Repository version working. No official release yet.
scrollutil	[nemethi]	
tablelist	[nemethi]	
tcl3dBasic	[PO]	Repository version working. No official release yet.
tcllib	[aku]	Repository version working. No official release yet.
tclssg	[dbohdan]	
tcltls	core.tcl-lang.org	Repository version 1.8. No official release yet.
tclws	[oehhar]	Repository version working. No official release yet.
tdom	[de]	
tkdnd	[petasis]	Repository version working. No official release yet.
tklib	[aku]	
tko	[rz]	Replacement for rbc and tkpath.
tksvg	[oehhar]	Not needed for Tk 8.7 and newer. SVG support built into Tk.
twapi	[APN]	Repository version working. No official release yet.
udp	[APN]	Tcl9 version available at https://core.tcl-lang.org/tcludp. Not tested yet.
wcb	[nemethi]	

Porting status: Working

The following libraries work with Tcl 9, but do not seem to be actively developed.
Working means: Simple test script works.

Package	Version
awthemes	10.4.0
materialicons	0.2
puppyicons	0.1
tclargp	0.2
tclfpdf	1.6

Porting status: Working with modifications

The following libraries have been changed by PO to compile with Tcl 9.
Working means: Simple test script works.

Package	Start version	Ported version	Comments
DiffUtil	0.4.2	0.4.3	
ffidl	0.9.0	0.9.1	
fitsTcl	2.5	2.5.1	
imgjp2	0.1	0.1.1	
imgtools	0.3	0.3.1	
iwidgets	4.1.1	4.1.2	
Mpexpr	1.2	1.2.1	Not working with gcc 14.
mqtt	3.1	3.1.1	
MuPDFWidget	2.3.2	2.3.1	
nacl	1.1	1.1.1	
parse_args	0.3.3	0.3.4	Newer version 0.5.1 available. Release file not working because of wrong links.
photoresize	0.2	0.2.1	
printer	0.9.6.15	0.9.6.16	
shellicon	0.1	0.1.1	
shtmlview	1.0.0	1.0.1	
Snack	2.2.11	2.2.12	
tclcsv	2.3	2.3.1	
tclgd	1.4	1.4.1	
tclMuPdf	2.3	2.3.1	Newer version 2.4 available. Not tested yet.
tclpy	0.4	0.4.1	
tclvfs	1.4.2	1.4.3	
Tkhtml	3.0.1	3.0.2	
Tktable	2.11	2.11.1	
treectrl	2.4.1	2.4.2	
tserialport	1.1	1.1.1	
tzint	1.1	1.1.1	
ukaz	2.0a3	2.0	

Porting status: Not compiling

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Package	Comments
expect	
oratcl	
rbc	See package tko::graph as replacement.
Tcladdressbook	
tclAE	
Tclapplescript	
tclx	Current release 8.6.3 not yet working with Tcl 9.
Tix	
tkpath	See package tko::path as replacement.
Trf	
trofs	

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Package	Comments
Canvas3d	
memchan	
rl_json	Newer version 0.15.1 available. Release file not working because of wrong links.
tbcload	
tclcompiler	
udp	Tcl9 version available at https://core.tcl-lang.org/tcludp. Not tested yet.
vectcl	

Porting status: BAWT Experiences

- The previous tables as well as the information at Wiki page *Porting extensions to Tcl 9* have been extracted from an Excel file.
- This Excel file is available at https://www.tcl3d.org/bawt/download/Tcl9-Port.xlsx

Typical problems with Tcl/Tk extensions

➢ Source code repositories are distributed over several sites:
   ex. Github, SourceForge, Chiselapp, core.tcl-lang.org, private, …

➢ Lots of Tcl extensions are not actively supported.

➢ Official versions are seldomly released.

➢ No or insufficient test suites.

➢ No official binary distribution available anymore:
   Formerly there was ActiveTcl and teacup.
   Now only private projects available, ex. BAWT, Magicsplat, AndroWish BI, …

These problems have been with Tcl/Tk since several years.

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Possible solutions / First steps

Source code repositories are distributed over several sites:

Move (or mirror) all actively supported packages in a central place,
ex. core-tcl-lang.org or Github.

Add selected packages as supported by the Tcl core like itcl, tdbc, sqlite and thread.
    Possible candiates: tcltls, udp,
Add important packages as supported by the Tk core.
    Possible candidates: scrollutil, tablelist, tko (as tkpath successor)
Drawback: Low release update rate of Tcl/Tk core.

No official binary distribution available anymore:

Creating binary distributions is getting more and more difficult
resp. expensive due to security reasons.
Official code signing cannot be done be a single OpenSource developer for multiple platforms!