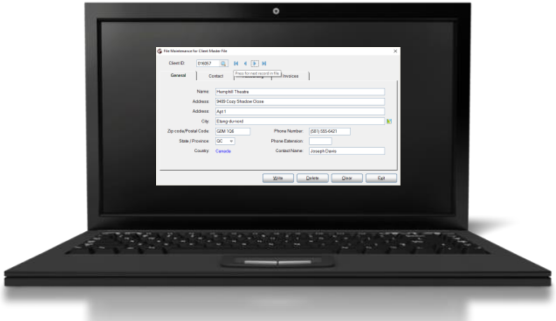
Your Source is Changing

PxPlus 2016 (v13)

Your Source is Changing

- Environments have changed
  - As should the way you handle your source

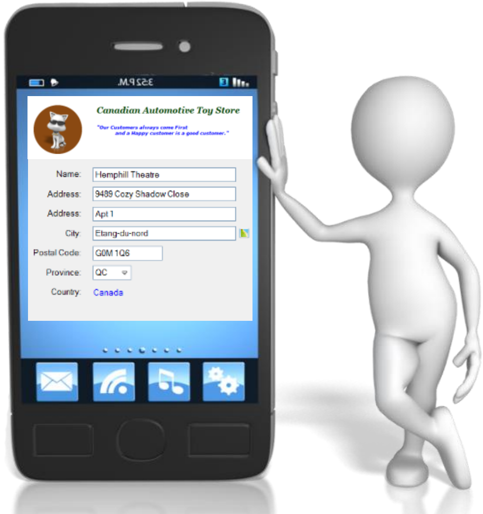
```
Input K$
Read (1, Key=K$) A1$
IF A1$ = "C" then
    Goto 0100
Print "Ye hath err'd"
```



File Maintenance for Client Master File

Client ID: 016057

Name: Hemphill Theatre
Address: 9489 Cozy Shadow Close
Address: Apt 1
City: Etang-du-nord
Zip code/Postal Code: G0M 1Q6
State / Province: QC
Country: Canada
Phone Number: (581) 555-6421
Phone Extension:
Contact Name: Joseph Davis



Canadian Automotive Toy Store

"Our Customers always come First and a Happy customer is a good customer."

Name: Hemphill Theatre
Address: 9489 Cozy Shadow Close
Address: Apt 1
City: Etang-du-nord
Postal Code: G0M 1Q6
Province: QC
Country: Canada

Your Source is Changing

Your source is precious – Protect it

Major Topics

- Review program structure
- Program files revisited
- Securing program source and execution
- Migrating to text source files
- Source control systems
- New ED+ source editor
- PxPlus 2017 program changes

Review Program Structure

What is a program made of?

Program Structure

- A program consists of multiple lines of executable code
  - Each line gets converted and executed as Pseudo code
    - Internally line consists of line number followed by Pseudo code
    - This Pseudo code is interpreted by PxPlus
    - Using Pseudo code provides portability between platforms
  - Pseudo code contains tokenized program
    - Each syntactical unit converted to token
    - Variable syntax units such as labels and variable names are encoded into Pseudo code

Program Structure

- Sample Pseudo code
  - Take the statement:

```
0010 IF A = 123 THEN GOSUB MyLabel
```

  - As Pseudo code this becomes:

```
  10       IF        A        =       123     ~~THEN~~ GOSUB
$000A$ + $B5$ + $0101$+"A" + $27$ + $0B007B$   +  $B3$ +
           MyLabel        (End)
        $0A07$+"MyLabel"+$FF$
```

Program Structure

- Program can be reconstructed from Pseudo code
  - PxPlus contains functionality to recreate a "listable" program statement from Pseudo code
    - Not necessarily an exact match to original input
    - Pseudo code omits some noise words such as LET and THEN
    - Spacing **not** preserved

What this means is, the code you create to run your application can be used to recreate the source.

Program Files

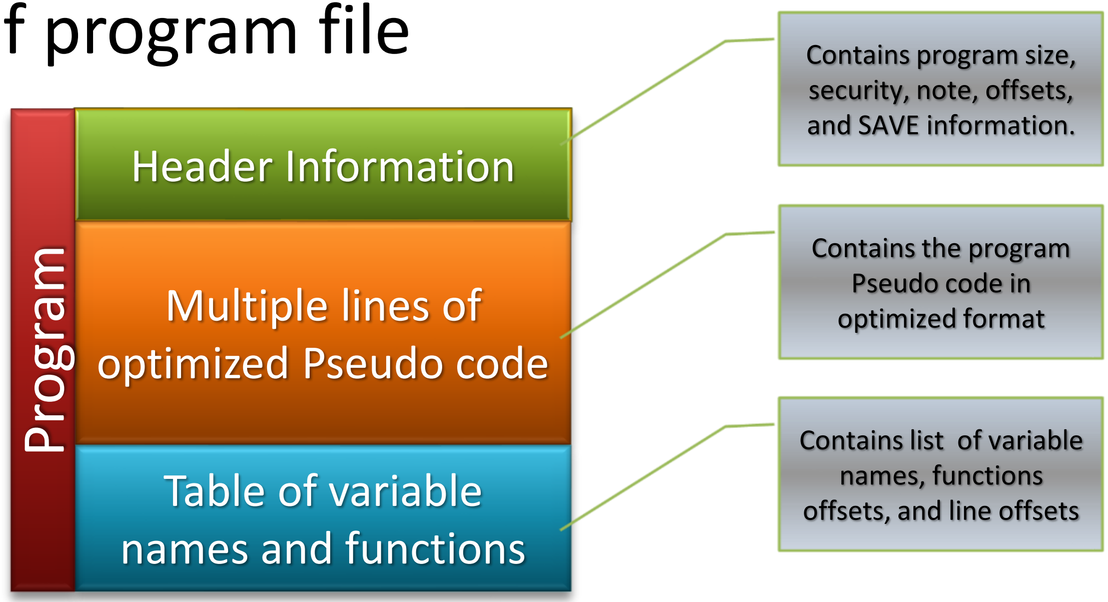
What is in a Program File?

Program Files

- Program files contain ‘optimized’ Pseudo code
    - Replaces the following:
        - Variable names with logical indices
            - *Every variable is assigned a sequential number in program code*
        - Statement references (numbers and labels) with direct offsets
    - Adds a table of function definitions
    - Improves performance by minimizing search times and reducing code size

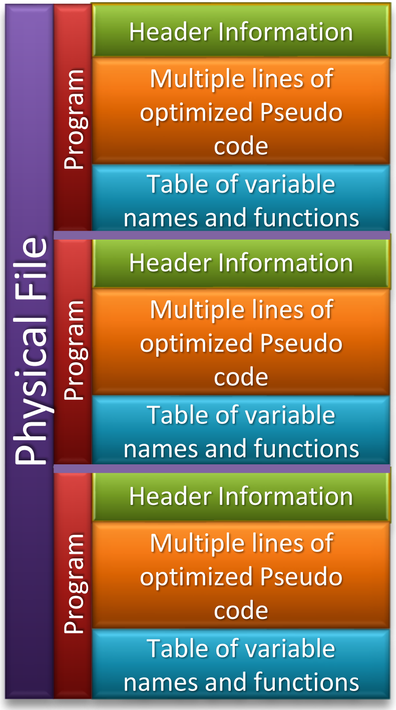
Program Files

- Physical layout of program file


Program
Header Information
Multiple lines of optimized Pseudo code
Table of variable names and functions
Contains program size, security, note, offsets, and SAVE information.
Contains the program Pseudo code in optimized format
Contains list of variable names, functions offsets, and line offsets

Program Files

- PxPlus has built-in version control
  - Single physical program file may contain multiple versions of a program.
  - Number of versions controled by ‘+R’ system parameter *(default = 5)*
  - PxPlus only loads ‘current’ version into memory
  - Each program has a version number
    - Version number has a Major/Minor value


Physical File
Program
Header Information
Multiple lines of optimized Pseudo code
Table of variable names and functions
Program
Header Information
Multiple lines of optimized Pseudo code
Table of variable names and functions
Program
Header Information
Multiple lines of optimized Pseudo code
Table of variable names and functions

Program Files

- How to access prior versions
  - *IT shows prior versions
    - Allows extraction to new file
    - Provides compare to prior versions
  - Command line utilities
    - RECALL to load prior versions
    - VER allows removal and cleanup of prior versions
      - Used to remove prior/interim versions prior release
      - Provides version number management

Securing Your Programs

How to keep your program source secure?

Securing Your Programs

- Programs can be secured by adding a password
  - Password protected programs:
    - Cannot be listed or edited without entering the password
    - Have contents (lines and variables) encrypted
    - Invalid password requests are progressively delayed
      - Helps to prevent ‘guessing’ password
    - Can be loaded and run on any system
      - Does not truly prevent piracy of application code

Program Files

- Programs can also be secured using reseller supplied encryption key
  - Reseller key controls access to programs
    - Controls if programs can be loaded, executed, listed or edited
    - Controls if new key-encrypted programs can be created
    - Key can have an expiry date
    - Twenty-five (25) application specific flags also provided
    - Same logic used for PxPlus Package control
  - Keys are generated/controlled by software supplier
    - May be used to prevent piracy of application code

Migrating Your Source to Text

How to use text files to maintain your source.

Migrating Source to Text Files

- PxPlus can LOAD / SAVE programs as text files
  - Issue LOAD, RUN, CALL or PERFORM of text file
    - System will automatically convert program to Pseudo code
    - Code will NOT be optimized
  - Saving program code to text file regenerates list format
    - Optionally, basic formatting will apply
    - Password and any owner encryption information will be lost
    - Only one version will be maintained on text file

Migrating Source to Text Files

- Text source can be used internally during development
  - Allows ANY external editor to be used
    - Examples: NOTEPAD, Ultra-edit, Eclipse
  - Text files preserve white space and structural indentation
  - Can convert to true 'program files' prior release
    - Use *PG.CNV utility to convert Text-to-Program and vice-versa

- Using source text allows use of Source Control Systems

Migrating Source to Text Files

- Typically source text programs don’t have line numbers
  - Here are some of the PROs and CONs

PRO	CON
Line insertion anywhere	Cannot just send replacement lines to PASTE into code
Minimizes tendency for Spaghetti code	Consistent line number between updates for error reporting
Avoids line insertions conflicting with exist line references	
No need to renumber to make space	
Avoids ‘Cluttered’ lines caused by trying to avoid line insertion	
Programs are easier to read	
Forces use of line labels thus improving self documented code	
Modern technique easier for new programmers	

Source Control Systems

Why should you use a Source Control System?

Source Control Systems

- Advantages of a Source Control System
  - Provides tracking of program changes
    - Records who made which change to what, when, and why
    - Enables easy comparison of older versions
  - Allows rollback to prior version
  - Enables multiple programmers to work on same program at same time
    - Updates to programs can be merged automatically
  - Repository can be kept off-site for backup
    - Tools available to access repository via the internet

Source Control Systems

- PVX Plus Technologies uses

  Apache Subversion (SVN)

  - In-house setup:
    - Built-in PxPlus SVN interfaces
      - Direct hooks found in Nomads and *IT editor
    - Tortoise SVN for Windows interface

The New ED+ Source Editor

What can it do for you?

ED+ Source Editor

- New Source editor in PxPlus 2016
  - Based on the open source ACE editor

    https://ace.c9.io/

  - Supports both Windows and Web based development
  - Includes 34 different themes and PxPlus syntax highlighting
  - Designed to edit programs in SOURCE form
    - Does support program files

ED+ Source Editor

- Launching the Editor
  - Command line
  - Call program

```
ed+ program
```

```
CALL “*ace/editor”,“program”
```

- Where *program* is the name of the program to edit:
  - If text file, it will be opened
  - If SVN controlled program, SVN source will be opened
  - If program file, system will look for source file *program.pxprg* in same directory

ED+ Source Editor

- The ED+ screen layout

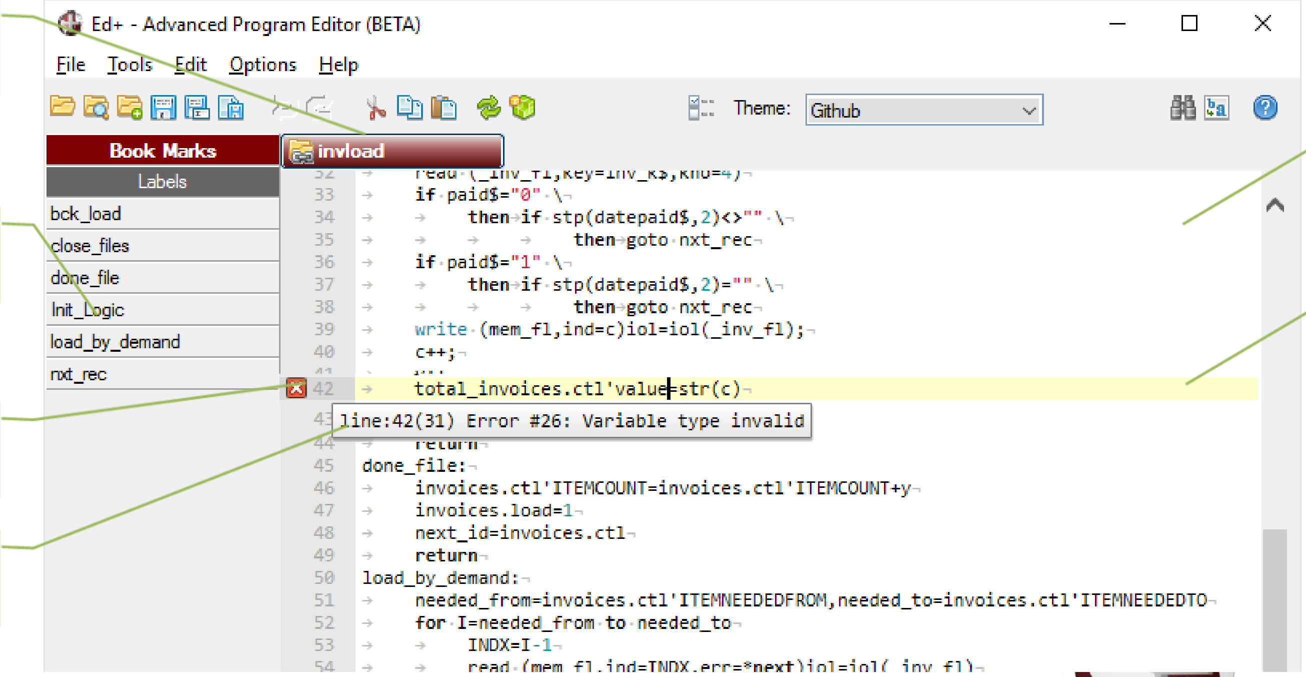
Name of program

Red indicates changed

Labels & Functions

Warning/Error Indicator

Error Message (on hover)



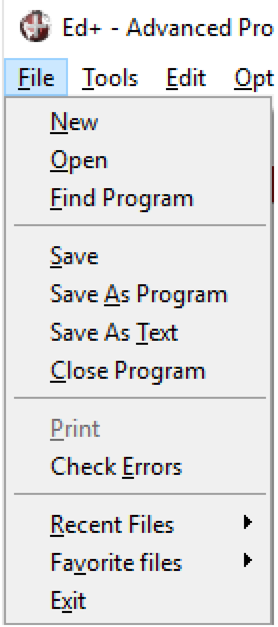
```
32  →    read (_inv_fl,key=inv_k$,kno=4)
33  →    if paid$="0" \
34  →    →    then if stp(datepaid$,2)<>"" \
35  →    →    →    →    then goto nxt_rec
36  →    if paid$="1" \
37  →    →    then if stp(datepaid$,2)="" \
38  →    →    →    →    then goto nxt_rec
39  →    write (mem_fl,ind=c)iol=iol(_inv_fl);
40  →    c++;
42  →    total_invoices.ctl'value=str(c)
43 line:42(31) Error #26: Variable type invalid
44  →    return
45 done_file:
46  →    invoices.ctl'ITEMCOUNT=invoices.ctl'ITEMCOUNT+y
47  →    invoices.load=1
48  →    next_id=invoices.ctl
49  →    return
50 load_by_demand:
51  →    needed_from=invoices.ctl'ITEMNEEDEDFROM,needed_to=invoices.ctl'ITEMNEEDEDTO
52  →    for I=needed_from to needed_to
53  →    →    INDX=I-1
54  →    →    read (mem_fl,ind=INDX,err=*next)iol=iol(_inv_fl)
```

Program Source

Current Line Highlight

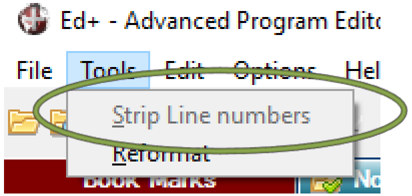
ED+ Source Editor

- Menu bar selection: File
  - Ability to open new or existing file
    - Find file open uses standard program search
  - Can save program as program or text file
  - Force a check for errors
  - Preserves last 10 files opened
  - Allows saving up to 10 favorite programs



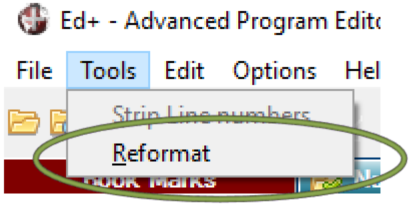
ED+ Source Editor

- Menu bar selection: Tools
  - Strip Line numbers
    - Removes all line number references and replaces with statement labels
      - Generated labels LBL_*nnnnn* where *nnnnn* is original line number
      - Uses logical labels of *SAME and *NEXT where viable



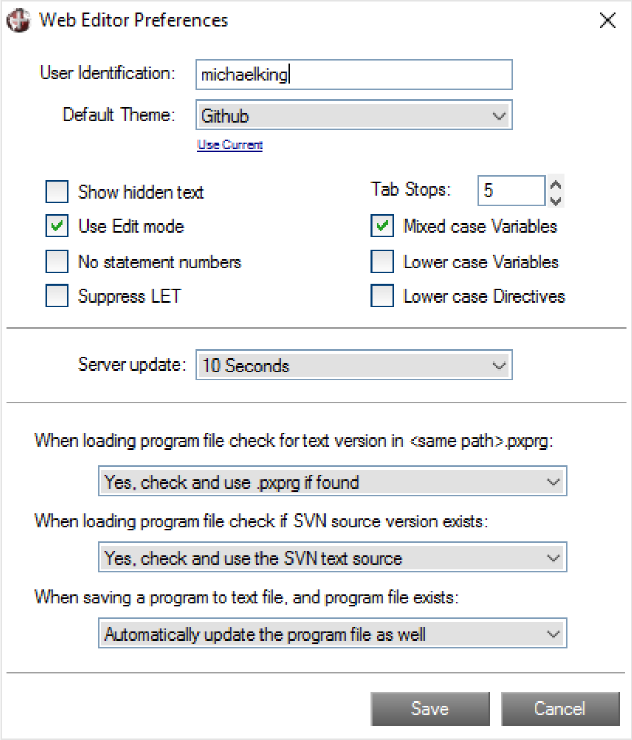
ED+ Source Editor

- Menu bar selection: Tools
  - Reformat
    - Applies indentation based on structure
      - TAB characters used to indent logic
      - Works on whole program to assure proper indentation
      - Only available for non-line numbered programs
    - Indentation lost if result saved to PROGRAM file



ED+ Source Editor

- Menu bar selection: Options
  - Preferences
    - Allows setting userid for use on WEB
    - Defines theme for display
    - Show hidden text shows tabs and spaces
    - Defines TAB stops (default 5)



Web Editor Preferences

User Identification: michaelking

Default Theme: Github

□ Show hidden text
☑ Use Edit mode
□ No statement numbers
□ Suppress LET

Tab Stops: 5

☑ Mixed case Variables
□ Lower case Variables
□ Lower case Directives

Server update: 10 Seconds

When loading program file check for text version in <same path>.pxprg:

Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

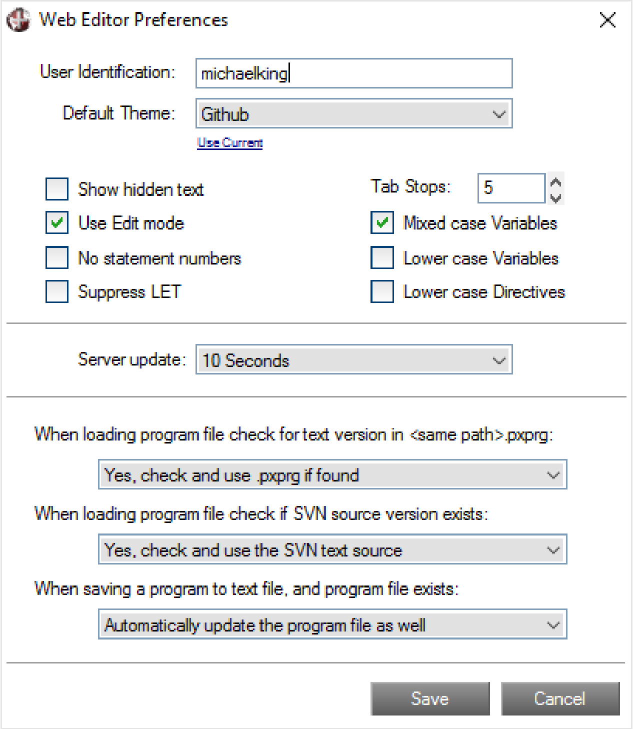
Yes, check and use the SVN text source

When saving a program to text file, and program file exists:

Automatically update the program file as well

ED+ Source Editor

- Menu bar selection: Options
  - Preferences *continued:*
    - Program source display options same as *IT
      - Edit mode
      - No stmt numbers
      - Suppress LET
      - Mixed case variables
      - Lower case variables
      - Lower case directives
    - Server update frequency defines how often auto-save is done



Web Editor Preferences

User Identification: michaelking

Default Theme: Github

☐ Show hidden text

☑ Use Edit mode

☐ No statement numbers

☐ Suppress LET

Tab Stops: 5

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☐ Lower case Directives

Server update: 10 Seconds

When loading program file check for text version in <same path>.pxprg:

Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

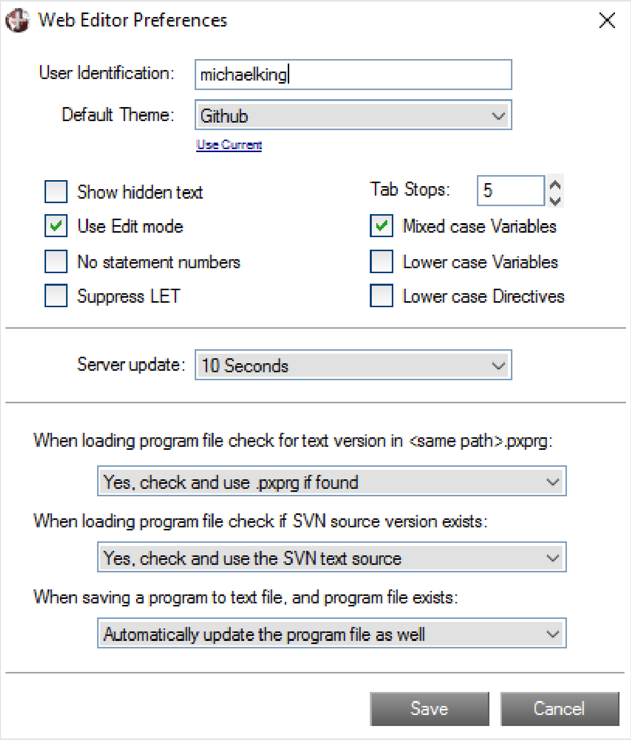
Yes, check and use the SVN text source

When saving a program to text file, and program file exists:

Automatically update the program file as well

ED+ Source Editor

- Menu bar selection: Options
  - Preferences *continued*:
    - When loading program file, check if text .pxprg also exists
      - Yes, check and use .pxprg if found
      - No, don't check for presence of .pxprg
      - Ask which to use if .pxprg is present



Web Editor Preferences

User Identification: michaelking

Default Theme: Github

Use Current

□ Show hidden text

☑ Use Edit mode

□ No statement numbers

□ Suppress LET

Tab Stops: 5

☑ Mixed case Variables

□ Lower case Variables

□ Lower case Directives

Server update: 10 Seconds

When loading program file check for text version in <same path>.pxprg:

Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

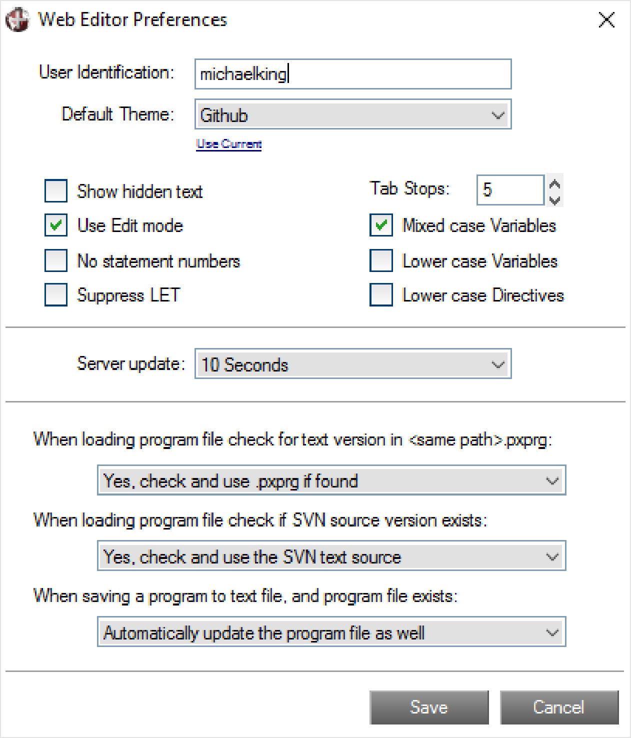
Yes, check and use the SVN text source

When saving a program to text file, and program file exists:

Automatically update the program file as well

ED+ Source Editor

- Menu bar selection: Options
  - Preferences *continued:*
    - When loading program file, check if SVN source exists
      - Yes, check and use the SVN text source
      - No, edit program object code and let OS update SVN
      - Ask which to use if SVN text source exists



Web Editor Preferences

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Tab Stops: 5

☑ Mixed case Variables

☐ Lower case Variables

☐ Lower case Directives

Server update: 10 Seconds

When loading program file check for text version in <same path>.pxprg:

Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

Yes, check and use the SVN text source

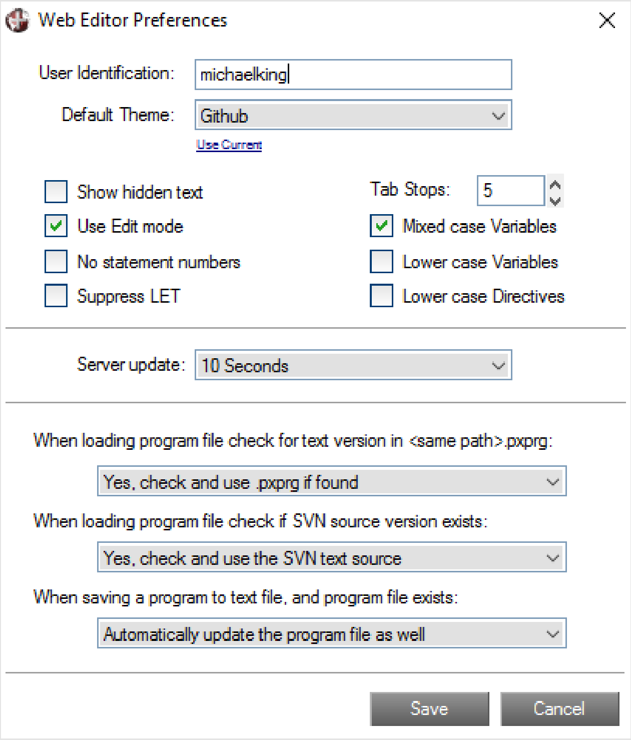
When saving a program to text file, and program file exists:

Automatically update the program file as well

DireXions 2016

ED+ Source Editor

- Menu bar selection: Options
  - Preferences *continued:*
    - File save rules when saving to text and program file also exists
      - Automatically update the program file as well
      - Don't update the program file
      - Ask if you also want the program file updated



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Default Theme: Github

Use Current

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☐ Suppress LET

Tab Stops: 5
☑ Mixed case Variables
☐ Lower case Variables
☐ Lower case Directives

Server update: 10 Seconds

When loading program file check for text version in <same path>.pxprg:

Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

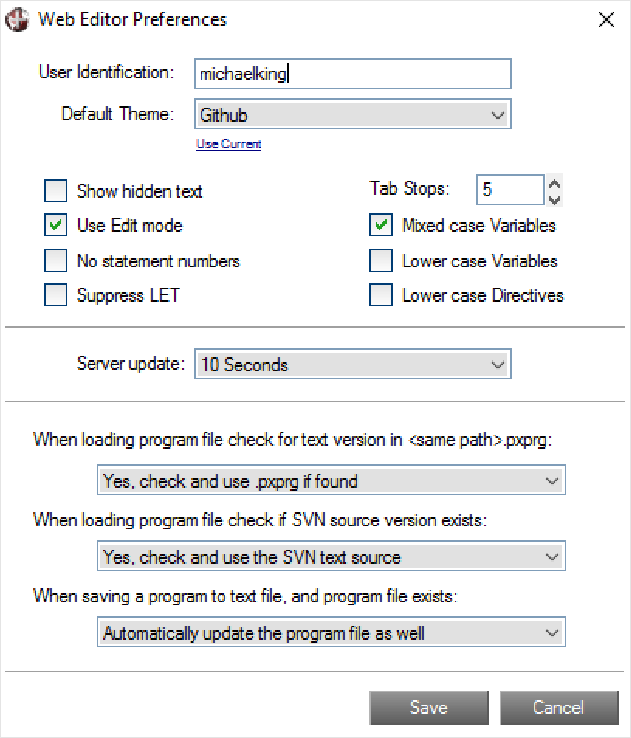
Yes, check and use the SVN text source

When saving a program to text file, and program file exists:

Automatically update the program file as well

ED+ Source Editor

- Menu bar selection: Options
  - Preferences *continued:*
    - Preferences will be saved in
      - INI when used on Windows
      - localstore when used in browser



Web Editor Preferences

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Yes, check and use .pxprg if found

When loading program file check if SVN source version exists:

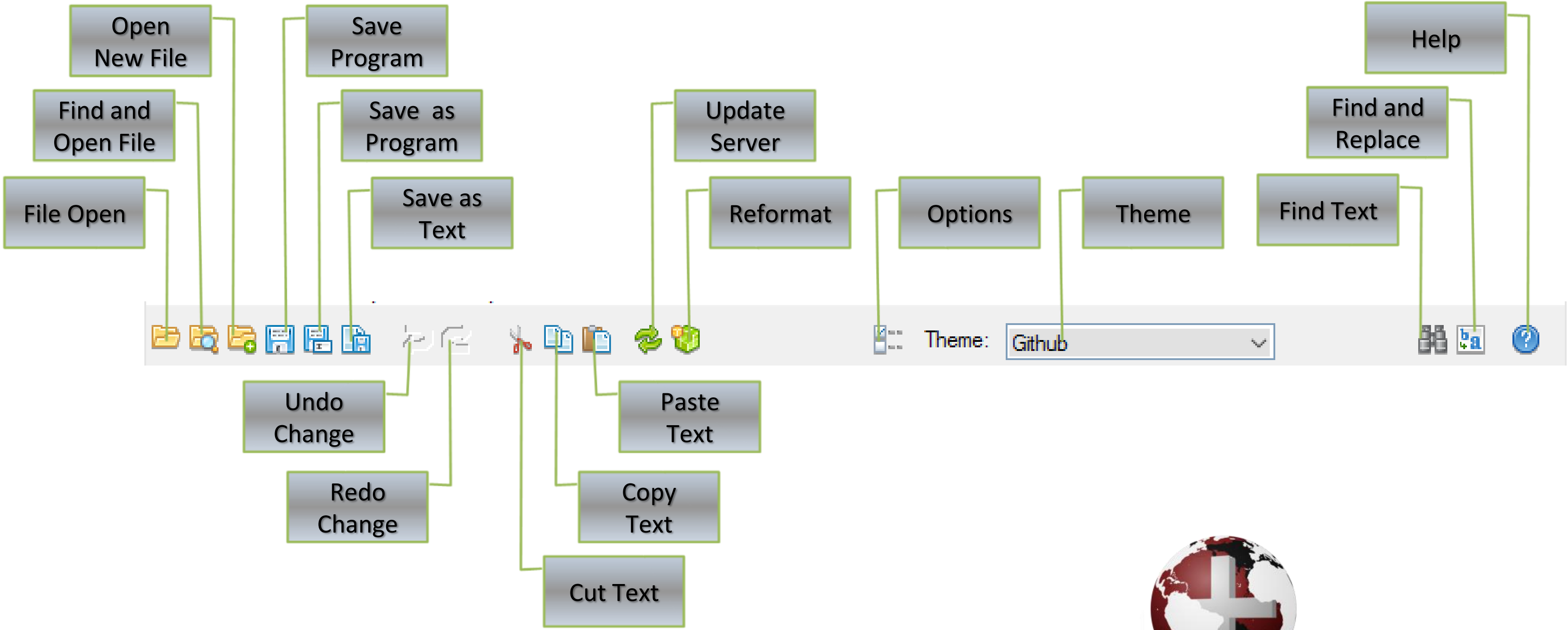
Yes, check and use the SVN text source

When saving a program to text file, and program file exists:

Automatically update the program file as well

ED+ Source Editor

- The ED+ tool bar



Open New File

Find and Open File

File Open

Save Program

Save as Program

Save as Text

Update Server

Reformat

Options

Theme

Find Text

Find and Replace

Help

Theme: Github

Undo Change

Redo Change

Paste Text

Copy Text

Cut Text

ED+ Source Editor

Planned for 2017

- Under development
  - Print functionality
  - PxPlus syntax highlighting improvements
  - Macro libraries like *IT
  - Ability to add passwords and owner codes
  - Version recall from Program file
  - Prior/Next error
  - SVN Interfaces

PxPlus 2017 Program Changes

How are we making coding easier?

Planned For PxPlus 2017

- Changes coming to language
  - Automatic variable type conversions
    - System will determine type needed to perform function

NEW Syntax	Effectively will become
X$ = 1.23	X$ = STR(1.23)
X = 1.23 + QOH$	X = 1.23 + NUM(QOH$)
MSGBOX “Client owes ”+balance	MSGBOX “Client owes “+STR(balance)

-
  -
    - Using NEW syntax will require you to use PxPlus 2017
      - Syntax will NOT be backwards compatible

Planned For PxPlus 2017

- New option for SAVE to strip comments
  - Reduces memory required to load programs
  - Will improve execution speed
  - Help obfuscate your logic
- New encryption algorithms for programs
- Option to password program with NO option to remove password

Additional Resources

The help link(s) below refer to the current on-line help pages. The functionality may have been further updated since the PxPlus 2016 (version 13) release.

- Projects & the IDE
- Ed+ Source Editor
- Adding Tasks to Project
- Project Maintenance