

# UNIXvisual Quick Start

UNIXvisual requires a root directory from which to start. UNIXvisual will use the underlying file system or a user specification and there then are two ways to specify the root directory: through the change root directory option or through a specification file (.unix).

A notional system can be defined through a specification file. The file contains text that indicates the root directory, users, user-to-group assignment, objects and their permissions (information listed by using command “ls -l yourobject”). Below is an example:

```
UNIX
root: ./pseudoroot
user: tony, mike, lucy, mary
user: jim
group: tester          mike
group: developer      tony, lucy
group: manager        mary, jim
object: drwsrwxr--    tony:developer    -r      /code
object: rwsrw-r--    tony:developer    /code/program1
object: drwxrw-r--    mary:manager      -r      /document
object: drwxrw-r--    mary:manager      -r      /document/projectA
object: drwxrw-r--    mary:manager      -r      /document/projectA/testers
object: drwxrw-r--    jim:manager        -r      /document/projectB
object: drwxrw-r--    jim:manager        -r      /document/projectB/developers
object: drwxrwx--x    mike:tester        -r      /test
```

# User and Group View

The screenshot shows the UNIXvisual application window. The title bar reads "UNIXvisual". The menu bar includes "Permission Calculator", "Object View", "User View", "Group View", and "Program Trace View". The "Object View" menu is currently selected. The main content area is divided into several sections:

- Settings:** Contains a "Relation:" section with radio buttons for "OR" and "AND" (selected). Below it is a "Permissions" section with checkboxes for "Read", "Write", "Execute", "Setuid", "Setgid", and "Sticky", all of which are checked.
- Permissions for Regular File:** Includes definitions for Read, Write, and Execute permissions.
- Permissions for Directory:** Includes definitions for Read, Write, and Execute permissions.
- Refresh:** A button to update the data.
- Directory Tree:** A section with a note: "(Click on an object to see whether a user/group can access the object with specified permission.)".
- Object Permissions:** A large empty box on the right side of the window.
- Access Analysis:** Another large empty box at the bottom right.

Annotations with arrows point to specific icons in the top-left toolbar:

- An arrow points from a text box to the "Import" icon (a document with a green arrow), labeled: "(1.1) Import a specification file where root directory is specified (Based on file system defined in specification file and on the real system)".
- Another arrow points from a text box to the "Set Root" icon (a folder with a green arrow), labeled: "or (1.2) Set root directory (Only based on real file system)".

A green text box at the bottom right states: "User and Group View allows you to explore the set of objects that are accessible to a single user or to a specific group through the group permission bits".

or (1.2) Set root directory (Only based on real file system)

(1.1) Import a specification file where root directory is specified (Based on file system defined in specification file and on the real system)

User and Group View allows you to explore the set of objects that are accessible to a single user or to a specific group through the group permission bits

test.unix

Permission Calculator   Object View   User View   mike   Group View   localaccor   Program Trace View

Root: /Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot

(2) Choose a user or a group

User

- manwang
- root
- tony
- mike
- jim
- lucy
- mary

Groups

- mike
- tester

Other

Settings

Relation: ☐ OR ☒ AND

Permissions

☒ Read ☒ Write ☒ Execute

☒ Setuid ☒ Setgid ☒ Sticky

Permissions for Regular File

Read: View the content of a file.

Write: Allow changes to the content of a file.

Execute: Allow running a file as a binary.

Permissions for Directory

Read: List the content of the directory.

Write: Allow adding/removing objects under the directory.

Execute: Allow 'pass-through' the directory and perform allowed operations on files/directories beneath

Refresh

Directory Tree

(Click on an object to see whether a user/group can access the object with specified permission.)

Directory

/Users/manwang/Documents/workspace/Unix...

Object Permissions

Access Analysis

(3) Choose permissions and conjunction or disjunction

(4) Refresh

When a user is selected, a full permissions check is made. When access is allowed through any of the user, group, or world bits, UNIXvisual will indicate access is allowed.

test.unix

Permission Calculator   Object View   User View   mike   Group View   localaccor   Program Trace View

Root: /Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot

User

Groups

tester

Other

Permissions

Relation: ☒ OR   ☐ AND

☒ Read   ☒ Write   ☐ Execute

☐ Setuid   ☐ Setgid   ☐ Sticky

Permissions for Regular File

Read: View the content of a file.  
Write: Allow changes to the content of a file.  
Execute: Allow running a file as a binary.

Permissions for Directory

Read: List the content of the directory.  
Write: Allow adding/removing objects under the directory.  
Execute: Allow 'pass-through' the directory and perform allowed operations on files/directories beneath

Refresh

Directory Tree

(Click on an object to see whether a user/group can access the object with specified permission.)

Directory

/Users/manwang/Documents/workspace/Unix...

code/

program1

document/

projectA/

projectB/

test/

projectA/

Object Permissions

Directory	Permissions
1 projectA/	User:-1(mary) Group:-1(manager) Permission bits: 00764(rwxrw-r---
2 document/	User:-1(mary) Group:-1(manager) Permission bits: 00764(rwxrw-r---
3 /Users/manwang/Doc...	User:501(manwang) Group:20(staff) Permission bits: 00755(rwxr-xr-x-

Red text means the access is blocked at the step

Access Analysis

3. /Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot/: Bits in the "other" field are applied for this access. The other bits are r-x--.The 'x' bit allows passing through the directory.

2. document/: Bits in the "other" field are applied for this access. The other bits are r---.'x' is required to pass through this directory to files and directories beneath but this bit is not set.

(5) Files accessible with set permission shown in black. Select one for more information

When a group is selected, only the group permission bits are checked.

The screenshot shows the 'test.unix' application interface. At the top, there are tabs for 'Permission Calculator', 'Object View', 'User View' (set to 'mike'), 'Group View' (set to 'manager'), and 'Program Trace View'. The main area on the left shows the root path: `/Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot`. Below this, a 'Groups' section lists 'jim' and 'mary' in ovals, with 'manager' highlighted in a yellow box. A blue box with the text 'Choose a group' has an arrow pointing to the 'manager' group. The 'Group View' dropdown menu is open, showing a list of groups: 'sys', 'con...ers', 'daemon', 'nogroup', 'admin', 'dialer', 'inte...ers', 'manager' (highlighted), 'developer', and 'tester'. The 'Permissions' section shows various checkboxes for 'Read', 'Write', 'Execute', 'Setuid', 'Setgid', and 'Sticky'. The 'Object Permissions' table on the right shows the current permissions for the selected object. The 'Access Analysis' section at the bottom right provides a summary of the access analysis.

Root: `/Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot`

Choose a group

Groups

- jim
- mary
- manager**

Group View: manager

Permissions for Regular File

- Read: View the content of a file.
- Write: Allow changes to the content of a file.
- Execute: Allow running a file as a binary.

Permissions for Directory

- Read: List the content of the directory.
- Write: Allow adding/removing objects under the directory.
- Execute: Allow 'pass-through' the directory and perform allowed operations on files/directories beneath

Refresh

Directory Tree

(Click on an object to see whether a user/group can access the object with specified permission.)

Directory

- `/Users/manwang/Documents/workspace/Unix...`
- `code/`
- `document/`
- `test/`

Object Permissions

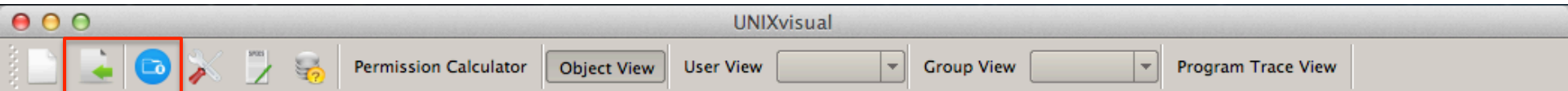
Directory	Permissions
1 <code>/Users/manwang/Doc...</code>	User:501(manwang) Group:20(staff) Permission bits: 00755(rwxr-xr-x-)

Access Analysis

1. `/Users/manwang/Documents/workspace/UnixVisual/src/pseudoroot/`: The group is not the group of the object so there is no access to the object.

# Object View





Object:

Group:

User:

(1) Enter an object path  
and click OK

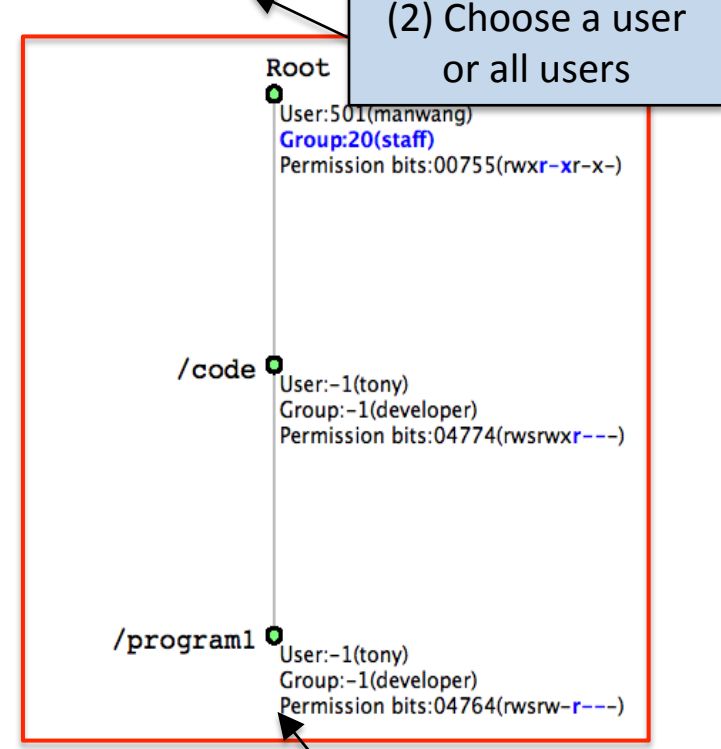
(0) Import a policy file or  
specify root directory  
if neither has been done

Object View allows an examination of all  
access allowed to a single object

Object: c/pseudoroot/code/program1 OK

Group: wheel,daemon,procmod,admin,kmem,procview,TTY,certusers,sys,operator,staff

User: All



(2) Choose a user or all users

Owner bits

Group bits

Other bits

(3) Click on a user to see detailed access with checkmark and crossmark

A list of all directories on the path between the root and the selected object

tony: rws

lucy: rw-

manwang: None

root: None

others: None

User "root" does not have access to the object.

Shows the groups clicked user belongs to

test.unix

Permission Calculator   Object View   User View   mike   Group View   manager   Program Trace View

Object: c/pseudoroot/code/program1   OK

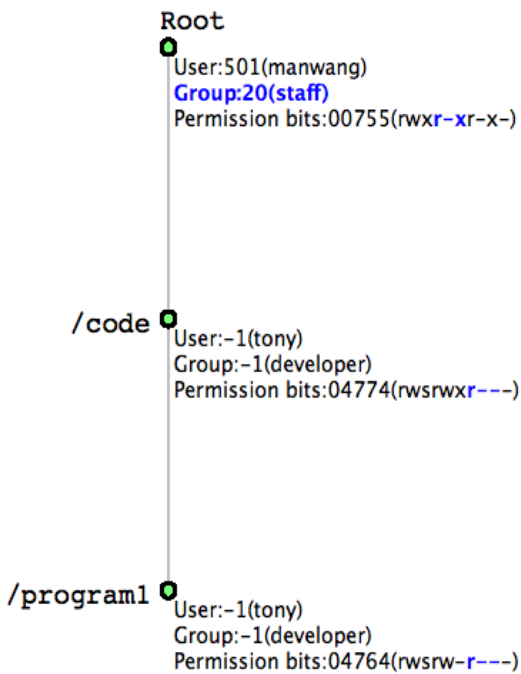
Group: wheel,daemon,procmod,admin,kmem,procview,TTY,certusers,sys,operator,staff

User: All

Owner bits

Group bits

Other bits



User "root" is not the owner of the object. But it is a member of the object's group "staff". Bits in the "group" field are applied for this access. The group bits are r-x.The 'x' bit allows passing through the directory.

Close



(4) Click on checkmark or crossmark to see analysis of permissions

User "root" is neither the owner of the object nor a member of the object's group "developer". Bits in the "other" field are applied for this access. The other bits are r---.'x' is required to pass through this directory to files and directories beneath but this bit is not set.

Close



tony:rws

lucy:rw-

manwang:None

root:None

others:None

User "root" does not have access to the object.

Object:  OK

Group:

User: **All**

Root

User:501(manwang)  
Group:20(staff)  
Permission bits:00755(rwxr-xr-x)

/code

User:-1(tony)  
Group:-1(developer)  
Permission bits:04774(rwsrwxr---)

/program1

User:-1(tony)  
Group:-1(developer)  
Permission bits:04764(rwsrw-r---)

Owner bits Group bits Other bits

Octal Decode Octal

Octal and Letter Notations

**0755**

**rwxr-xr-x**

update

Special	User	Group	Other
<input type="checkbox"/> setuid	<input checked="" type="checkbox"/> Read	<input checked="" type="checkbox"/> Read	<input checked="" type="checkbox"/> Read
<input type="checkbox"/> setgid	<input checked="" type="checkbox"/> Write	<input type="checkbox"/> Write	<input type="checkbox"/> Write
<input type="checkbox"/> Sticky bit	<input checked="" type="checkbox"/> Execute	<input checked="" type="checkbox"/> Execute	<input checked="" type="checkbox"/> Execute

Close

tony:rws

lucy:rw-

manwang:None

root:None

others:None

The permission information for objects are clickable

Permission calculator shows which permission bits are set based on the octal notation of the object clicked

Hover on a "user(group) permission" tuple in the last row for detailed analysis.

Examining a specific user  
is available too

test.unix

Permission CalculatorObject ViewUser ViewmikeGroup ViewmanagerProgram Trace View

Object: c/pseudoroot/code/program1OK

Group: manager

User: jim

	Owner bits	Group bits	Other bits
Root	User:501(manwang) Group:20(staff) Permission bits:00755(rwxr-xr-x)		✓
/code	User:-1(tony) Group:-1(developer) Permission bits:04774(rwsrwxr---)		X
/program1	User:-1(tony) Group:-1(developer) Permission bits:04764(rwsrw-r---)		jim:None

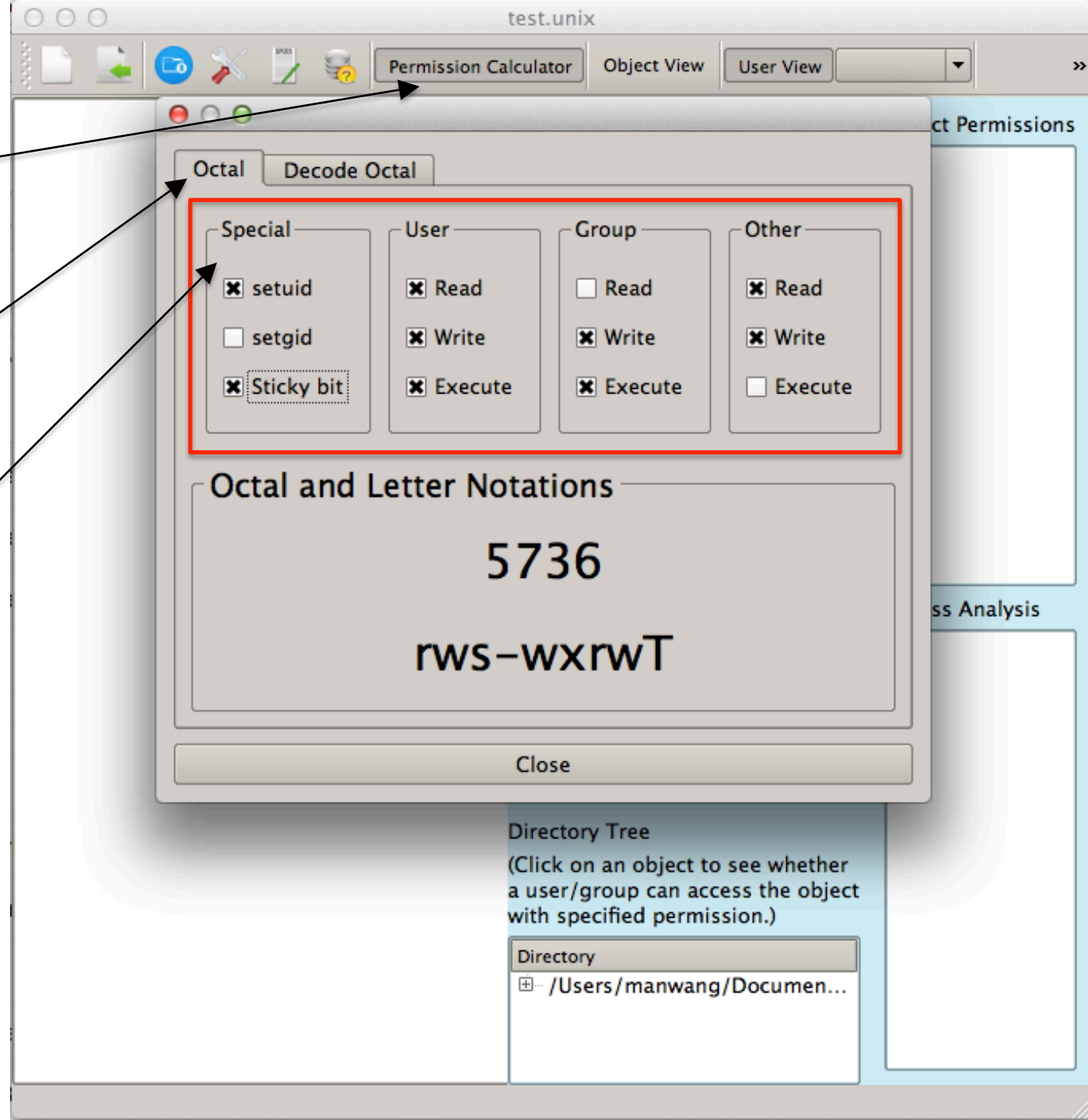
User "jim" does not have access to the object.

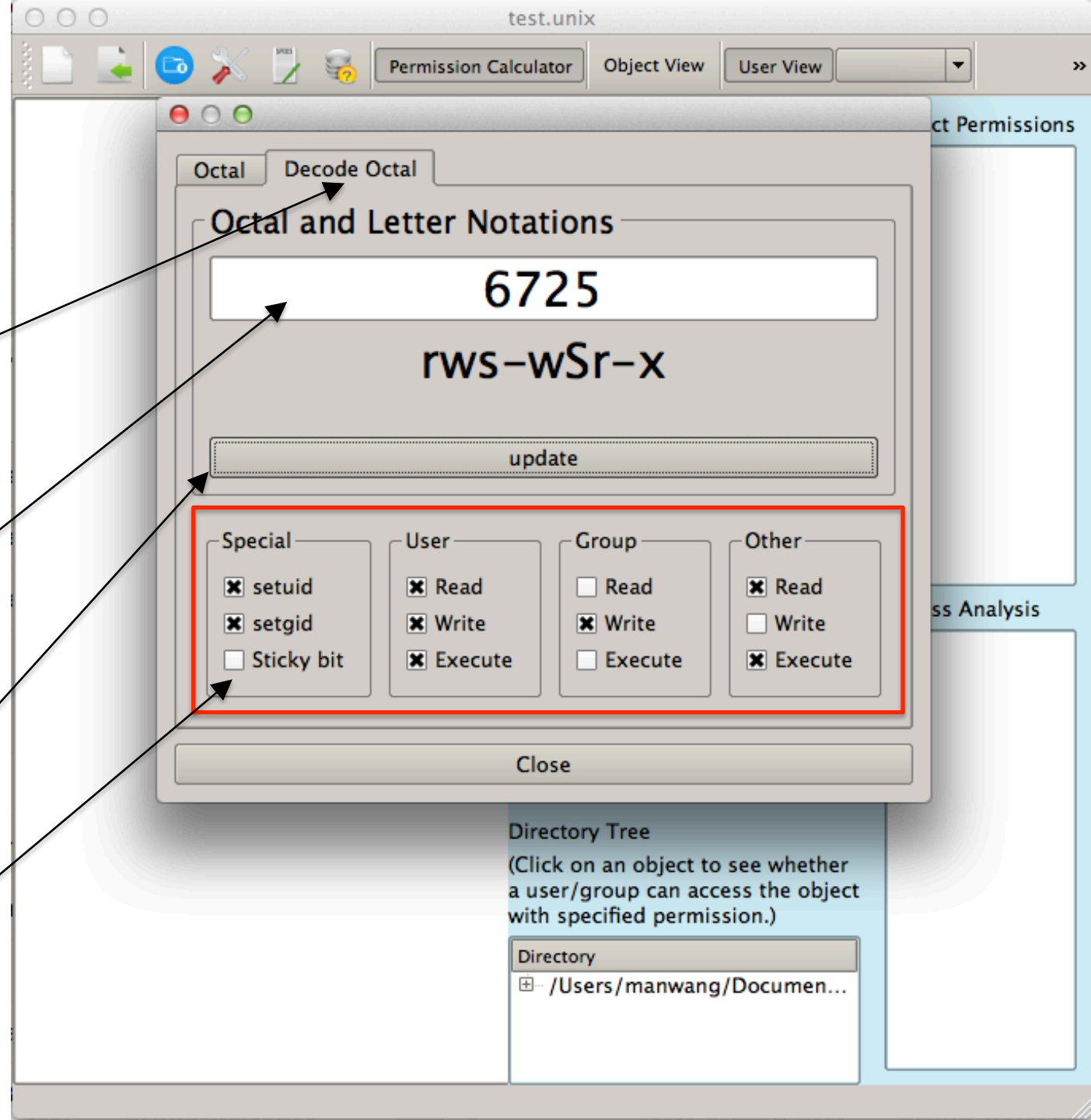
# Permission Calculator

(1) Click to toggle  
Permission  
Calculator

(2) Switch to  
converting  
permission to octal  
and letter notations

(3) Configure  
permission here





(1) Switch to decoding octal notation to letter notation and permission bit setting

(2) Enter permission in octal here and click update

(3) Click update

(4) See permission result here

#### Directory Tree

(Click on an object to see whether a user/group can access the object with specified permission.)

#### Directory

+ /Users/manwang/Documen...