

Software Version Control With Mercurial and Tortoise Hg

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Oakland University
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Abstract



- Mercurial and GIT are modern, open source, distributed version control systems that have replaced the older tools such as RCS, CVS, and Subversion. This talk will cover a short review of last-year's presentation that introduced Mercurial and good software practices using configuration management from swebok.org, and then go on to cover more advanced scenarios of using CM such as: 1) Merging of source code from more than one developer, and 2) Branching for a release and handling bug-fixes in prior releases. This presentation will also cover how to recover from common mistakes.

Agenda

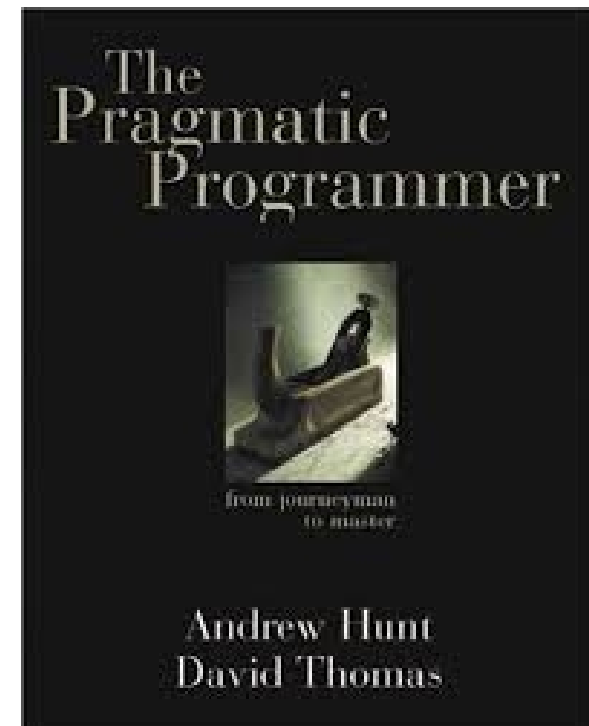


- Advertisement
- Advertisement
- Importance of Source Control to your project
- History of Source Control Tools
- Overview (Brief Review from Last Year)
- Advanced Topics
 - branching and merging
 - release branches
- Take-a-ways

Advertisement



- Certified Software Development Professional
- www.computer.org/csdp
- www.swebok.org
- Good software practices
- Many references



Advertisement



- www.ieee.org/join
- www.computer.org/join
- www.ieeeusa.org
- Benefits
 - Financial Advantage, myIEEE, IEEE.tv, IEEE email alias, IEEE-USA jobs, IEEE Societies, IEEE Spectrum Magazine, Member-get-a-Member, eBook Classics, Career Navigator, Career Webinars, IEEE Job Site, IEEE Women-in-Engineering, Online Communities, GoogleApps@IEEE, Continuing Education, CLE training, Discounts and travel, volunteering and leadership training, Humanitarian Programs, ...
- Member #40170447
- mark.ciechanowski@ieee.org (\$25 off)

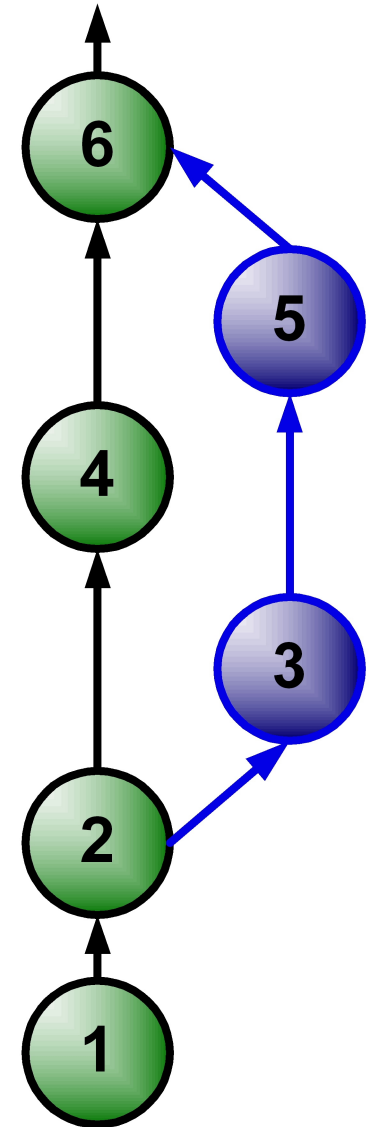


Bio

- MSSE
- PE
- CSDP
- IEEE Volunteer since 2003
- IEEE Past Section Chair
- 2013 IEEE Region 4 Secretary
- IEEE Senior Member

Revision Control Is...

- Manage changes to:
 - source files, make files, tests
 - release notes, doc, etc.
- Do not:
 - copy and paste files is **NOT** revision control!!
- Source Control Is **NOT** Backup!!!
- Purpose: change history
 - small changesets, check-in often



Importance of Source Control



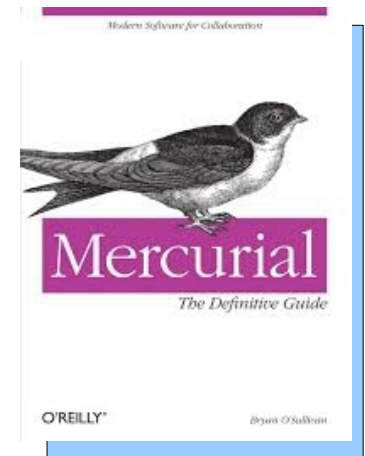
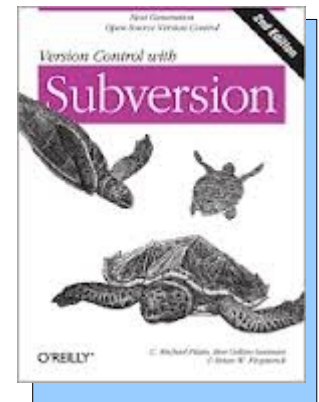
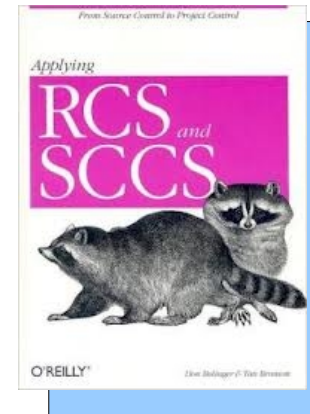
- Good Source Control is *your* professional *responsibility*
- Not: mgr, project, program,
- Good practice, just like make, unit testing, bugtracker, lint, etc.

*“It is **our job** as professionals to get better at what we do.”*

-- Dr. Chris Wagner

History of Rev Control Systems

- SCCS (UNIX)
- RCS
 - Lock-type concurrency model
- CVS, Visual SourceSafe (VSS)
- Subversion (SVN)
- ClearCase (IBM/Rational)
 - All have client-server repository models
- GIT and Mercurial
 - Merge-type concurrency model
 - Distributed repository model



Mercurial

- Modern, *distributed* revision control system
- Distributed - no central repo
- Runs on Linux, Windows, Mac OS X
- Check-in *changesets* to entire repository
 - not individual files
 - (although you can choose which files to save)
- You check-in whole repository changeset
- All subdirectories



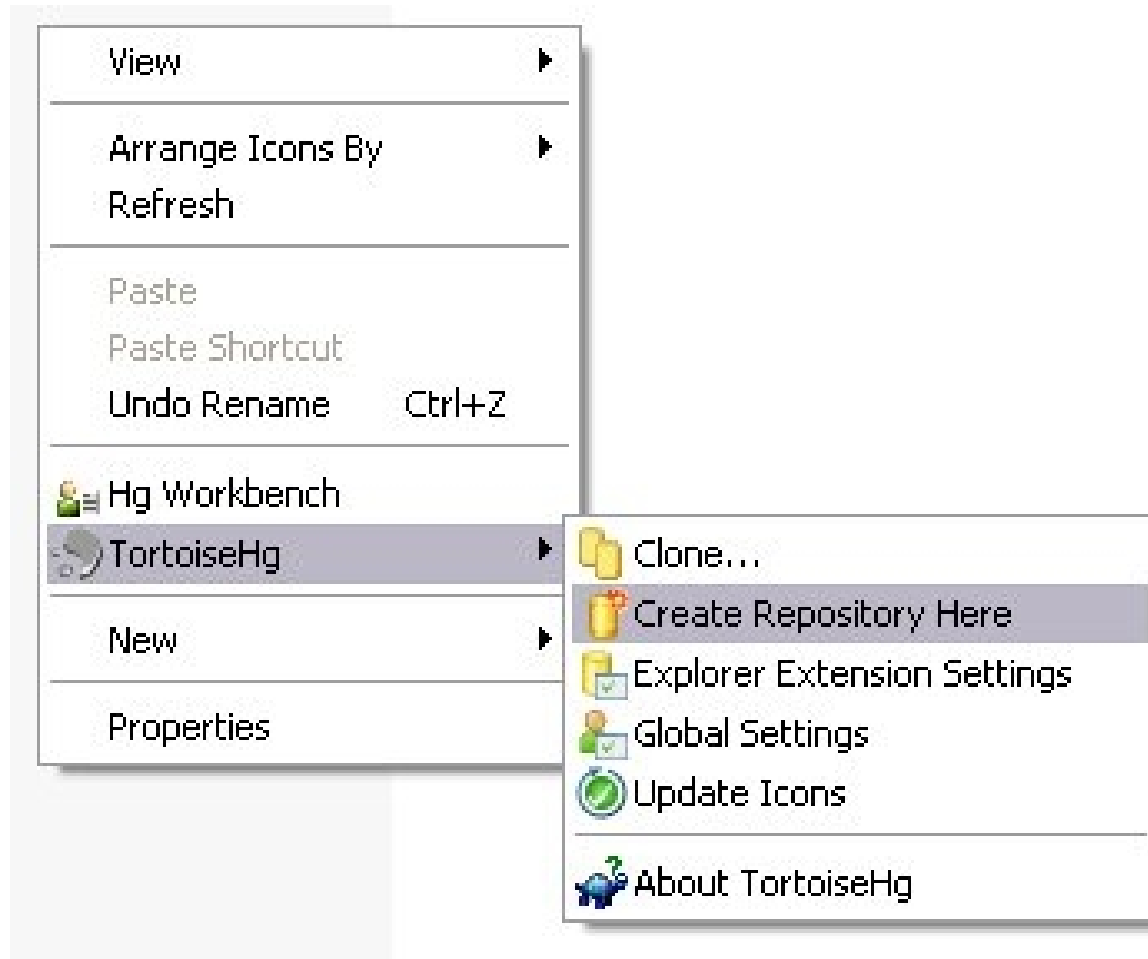
Mercurial



- Network ssh built-in, clone across net
- Tortoise Hg is the Windows interface
- Open source (GNU GPL v2)
- www.sourceforge.net

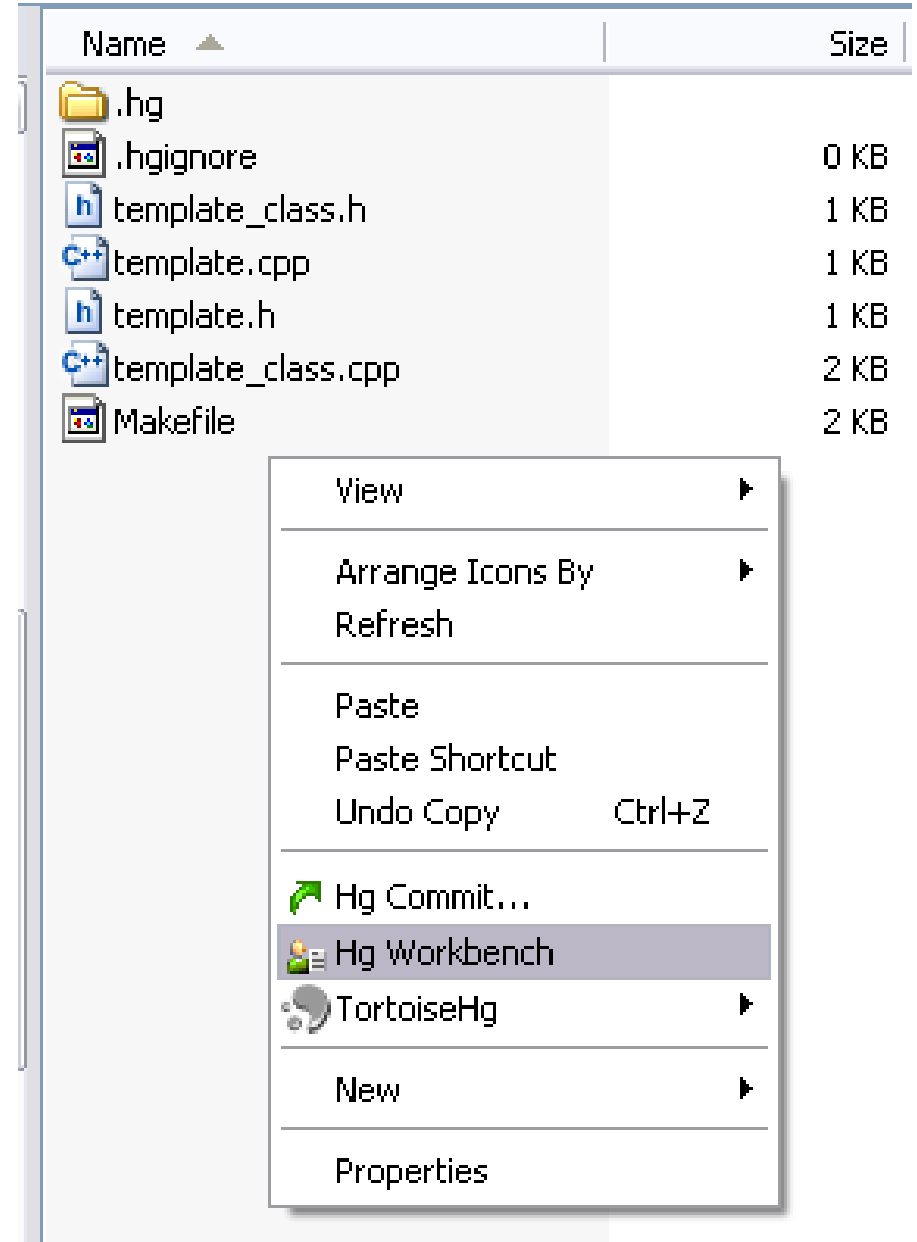
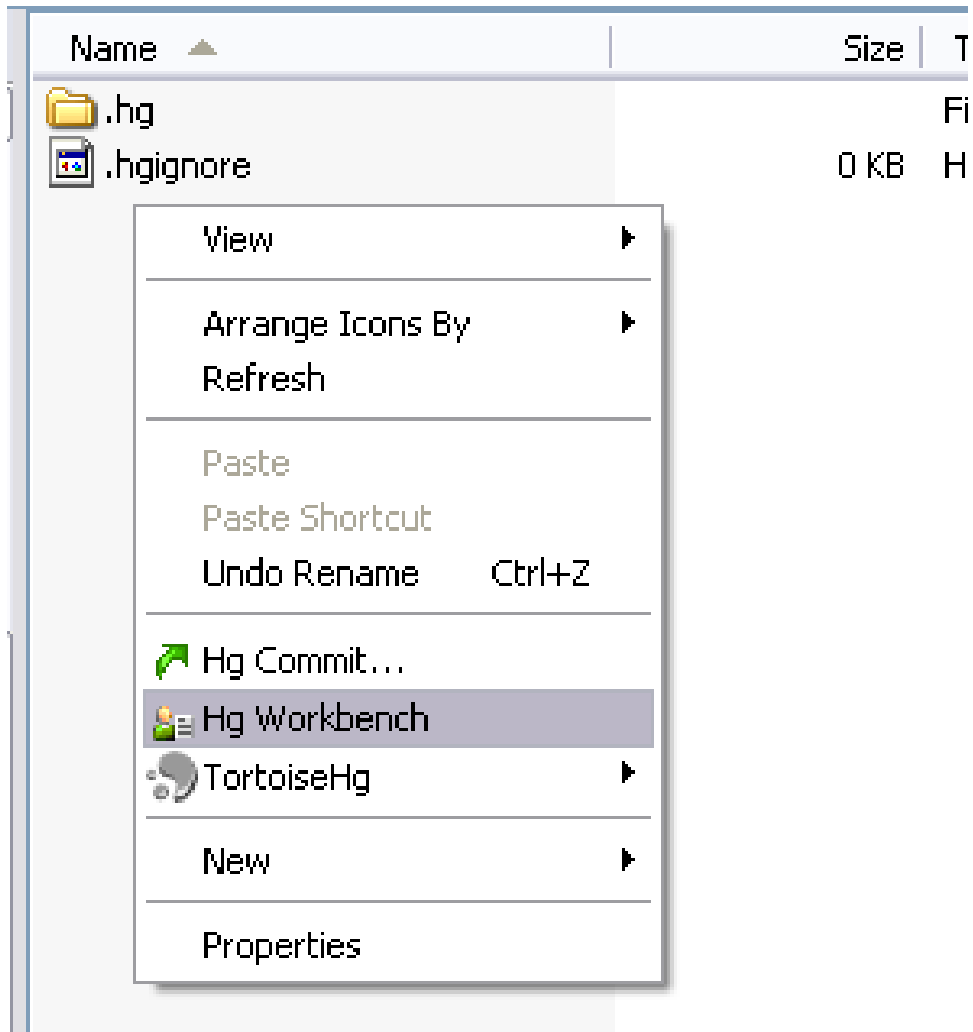


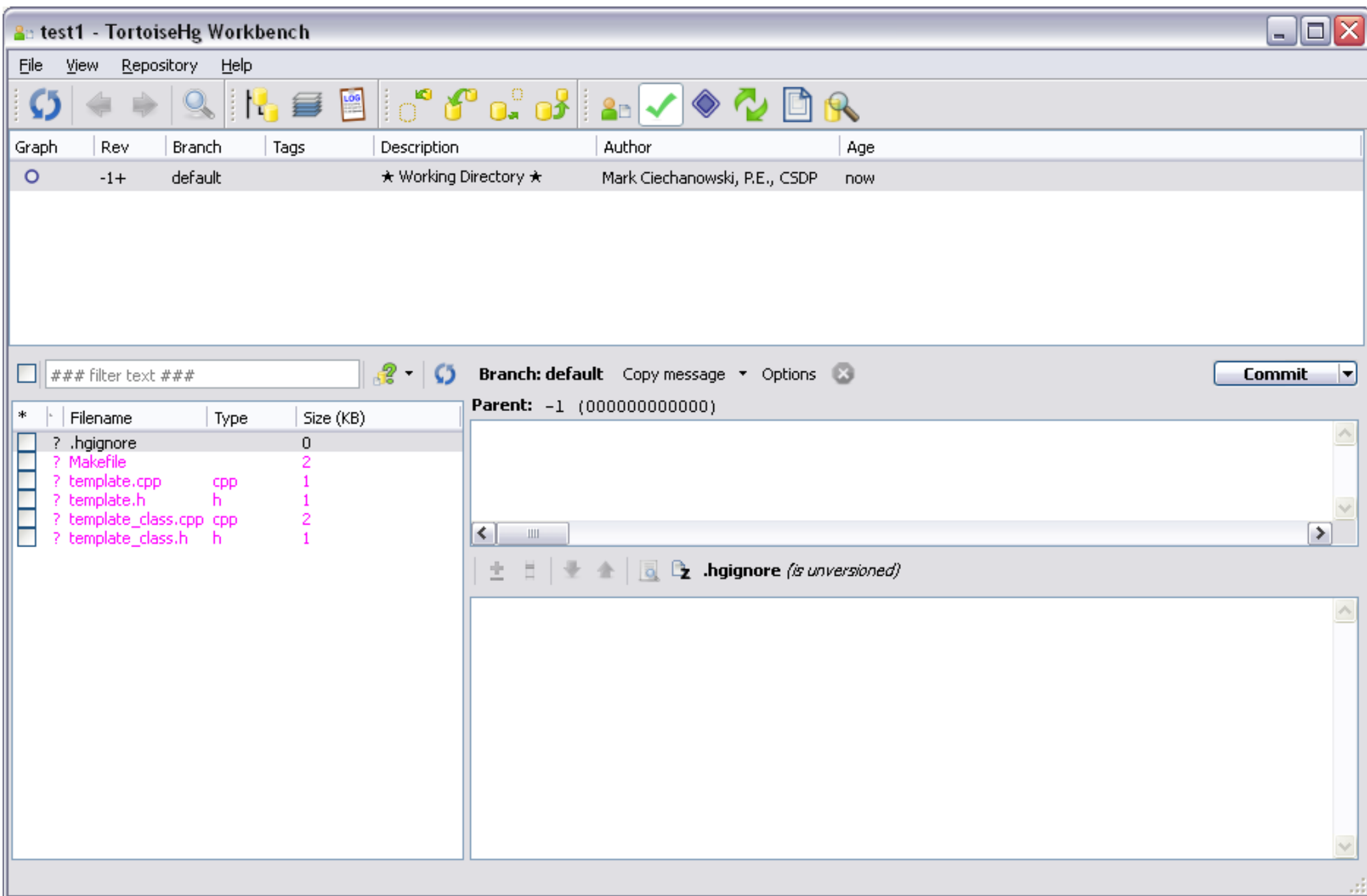
init



\$ hg init

Hg Workbench





mark.ciechanowski@ieee.org IEEE #40170447

test1 - TortoiseHg Workbench

File View Repository Help

Graph Rev Branch Tags Description Author Age

○ -1+ default ★ Working Directory ★ Mark Ciechanowski, P.E., CSDP now

filter text ### Branch: default Copy message Options Commit

*	Filename	Type	Size (KB)
	? .hgignore		0
	? Makefile		2
	? template.cpp	.cpp	1
	? templ		
	? templ		
	? templ		

Parent: -1 (000000000000)

template.cpp (is unversioned)

```

1 /*
2  * $Header$
3  * -----
4  * $Log$
5  * -----
6  */
7
8 /*
9  * Copyright (C) 2012 Mark Ciechanowski, P.E. All rights reserved.
10 * The copyright here does not evidence any actual or

```

Context menu for template.cpp:

- Edit (Ctrl+Shift+E)
- Open (Ctrl+Shift+O)
- Copy path
- Add
- Detect Renames...
- Ignore...
- Delete unversioned...
- Check
- Uncheck

test1 - TortoiseHg Workbench

File View Repository Help

Graph Rev Branch Tags Description Author Age

○ -1+ default ★ Working Directory ★ Mark Ciechanowski, P.E., CSDP now

filter text ### Branch: default Copy message Options Commit

* ▾	Filename	Type	Size (KB)
✓	A Makefile		2
✓	A template.cpp	cpp	1
✓	A template.h	h	1
✓	A template_class.cpp	cpp	2
✓	A template_class.h	h	1
?	.hgignore		0

Parent: -1 (000000000000)

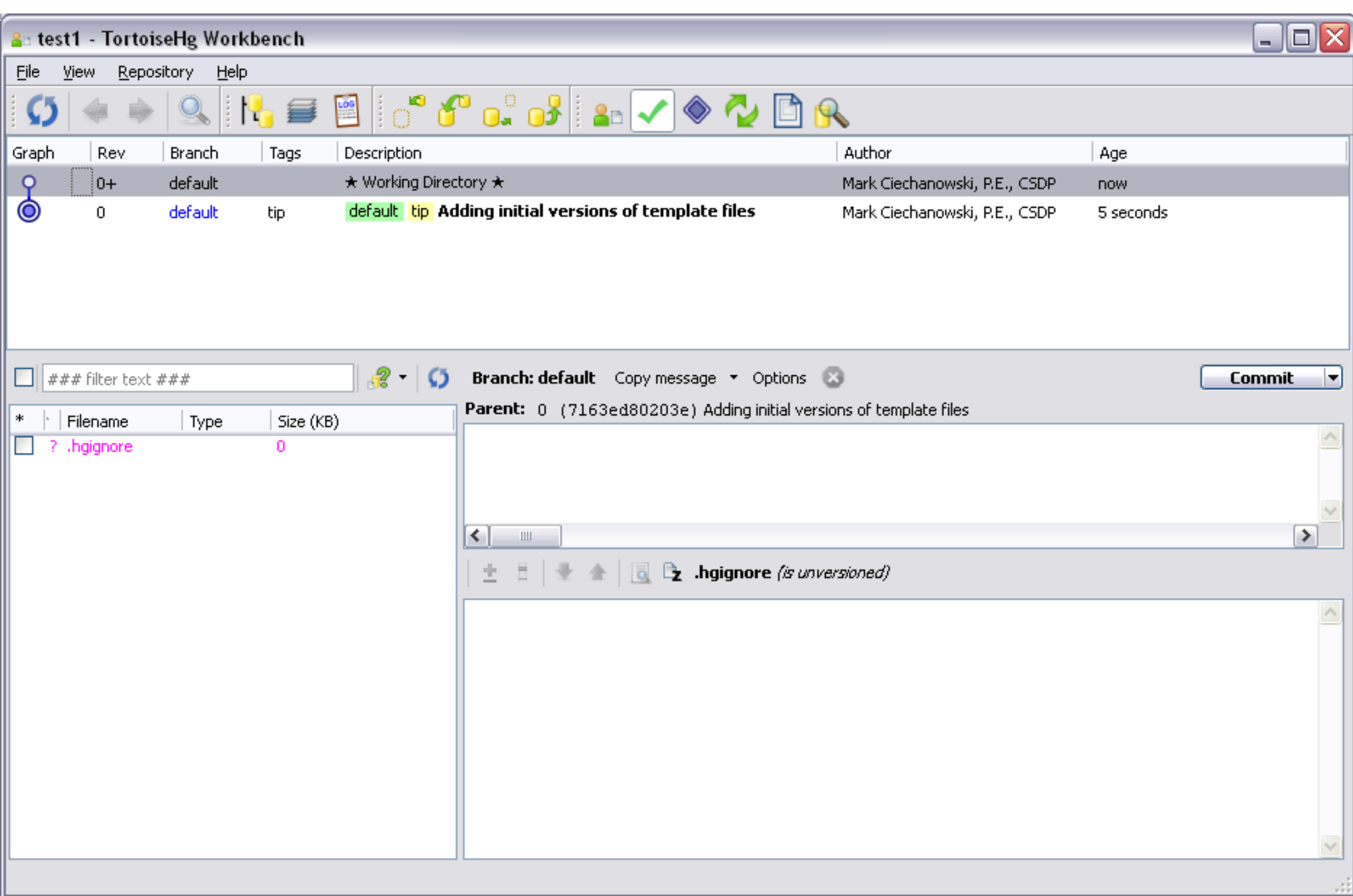
Adding initial versions of template files

Makefile (was added)

```

1 #
2 # $Header$
3 # -----
4 # $Log$
5 # -----
6
7 # from http://www.hsrl.rutgers.edu/ug/make_help.html
8 #
9 # 1. $@ is the name of the file to be made.
10 # 2. $? is the names of the changed dependents.

```

Graph	Rev	Branch	Tags	Description	Author	Age
	0+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	0	default	tip	default tip Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	25 minutes

- Show All
- + Makefile
 - + template.cpp
 - + template.h
 - + template_class.cpp
 - + template_class.h

Changeset: 0 (7163ed80203e) Adding initial versions of template files
User: Mark Ciechanowski, P.E., CSDP <markc@dgtech.com>
Date: 2013-10-18 18:21:03 -0400 (25 minutes)
Parent: [-1 \(000000000000\)](#)
Tags: tip

```
Adding initial versions of template files
```

```
# Makefile (was added)
1 #
2 # $Header$
3 # -----
4 # $Log$
5 # -----
6
7 # from http://www.hsrl.rutgers.edu/ug/make_help.html
8 #
9 # 1. $@ is the name of the file to be made.
10 # 2. $? is the names of the changed dependents.
11 # 1. $< the name of the related file that caused the action.
12 # 2. $* the prefix shared by target and dependent files.
13 #
14
15 .PHONY: clean
16 .SUFFIXES: .c .o .C .O
17
```

```
template.cpp (
File Edit Tools Syntax Buffers Window Help
[Icons]
32 /*
33  * isr
34  */
35 __interrupt void ISR(void)
36 {
37     unsigned int uiFlags;
38     while(uiFlags = (FLAG_REG & mask)) {
39         // ...
40     }
41     INT_REG = CLEAR;
42 }
43
44 /*
45 * -----
46 * -----
47 */
48 int main(int argc, char *argv[])
49 {
50     int ret;
51
52     // background loop
53     while(1) {
54         ret = check_status();
55         // ...
56     }
57
58     return(0);
59 }
60 /* end of file */
~
```



Graph	Rev	Branch	Tags	Description	Author	Age
	0+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	0	default	tip	default tip Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	28 minutes

filter text

Branch: default Copy message Options

Commit

*	Filename	Type	Size (KB)
<input checked="" type="checkbox"/>	M template.cpp	cpp	2
<input type="checkbox"/>	? .hgignore		0
<input type="checkbox"/>	? .template.cpp.swp	swp	12

Parent: 0 (7163ed80203e) Adding initial versions of template files

Added beginnings of ISR and a background loop

template.cpp

```

/*
+ * isr
+ */
+__interrupt void ISR(void)
+{
+    unsigned int uiFlags;
+    while(uiFlags = (FLAG_REG & mask)) {
+        // ...
+    }
+    INT_REG = CLEAR;
+}
+
+/*
+ * -----
+ * main
+ * -----
+ */
int main(int argc, char *argv[])
{
+    int ret;
+
+    // background loop
+    while(1) {
+        ret = check_status();
+        // ...
+    }

```



Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	1	default	tip	default tip Added beginnings of ISR and a background	Mark Ciechanowski, P.E., CSDP	2 seconds
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	31 minutes

filter text

*	Filename	Type	Size (KB)
<input type="checkbox"/>	? .hgignore		0
<input type="checkbox"/>	? .template.cpp.swp	swp	12


Branch: default Copy message Options

Parent: 1 (c5b82e574361) Added beginnings of ISR and a background loop

.hgignore (is unversioned)

test1 - TortoiseHg Workbench

File View Repository Help



Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	1	default	tip	default tip Added beginnings of ISR and a background	Mark Ciechanowski, P.E., CSDP	2 seconds
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	31 minutes

Show All

template.cpp

Changeset: 1 (c5b82e574361) Added beginnings of ISR and a background loop

User: Mark Ciechanowski, P.E., CSDP <markc@dgtech.com>

Date: 2013-10-18 18:52:45 -0400 (6 minutes)

Parent: [0 \(7163ed80203e\)](#) Adding initial versions of template files

Tags: tip

Added beginnings of ISR and a background loop

template.cpp

```

@@ -30,12 +30,30 @@
  */
  /*
+ * isr
+ */
+__interrupt void ISR(void)
+{
+    unsigned int uiFlags;
+    while(uiFlags = (FLAG_REG & mask)) {
+        // ...
+    }
+    INT_REG = CLEAR;
+}
+
+/*
+ * -----
- * main

```



File View Repository Help



Graph	Rev	Branch	Description	Author	Age	Tags
	37+	default	★ Working Directory ★	Mark Ciechanowski, P.E.	now	
	37	default	default tip changed flyer	Mark Ciechanowski, P.E.	3 days	tip
	36	default	Subra updates for topics, flyer. published.	Mark Ciechanowski, P.E.	7 days	
	35	default	added vector logo to flyer img on web page	Mark Ciechanowski, P.E.	8 days	
	34	default	added img	Mark Ciechanowski, P.E.	8 days	
	33	default	added vector logo	Mark Ciechanowski, P.E.	8 days	
	32	default	Correction for Salvador	Mark Ciechanowski, P.E.	9 days	
	31	default	Changed orange title to "Systems"	Mark Ciechanowski, P.E.	9 days	
	30	default	Changed to Embedded "Systems"	Mark Ciechanowski, P.E.	2 weeks	

filter text ### Branch: default Copy message Options Commit

- * | Filename
- ✓ M meetings_archive.html
- ? .hgignore
- ? email.encoder.src.pl
- ? ieee_email_encoder.txt
- ? ieee_template_flyer_a.doc
- ? ieee_template_flyer_b.doc
- ? ieee_template_flyer_c.doc
- ? ieee_template_flyer_d.doc
- ? images/Embedded_System_Workshop-2012-V3-3.doc
- ? images/Embedded_System_Workshop-2012-V3-4.doc
- ? images/Embedded_System_Workshop-2012-V6.doc
- ? images/Embedded_System_Workshop-2012-V6.pdf

Parent: 37 (11f8bf5e6ae4) changed flyer

```

meetings_archive.html
@@ -271,6 +271,21 @@
                                <p>
                                &nbsp;    
                                </p>
+                               <p>
+                               <table border="0">

```

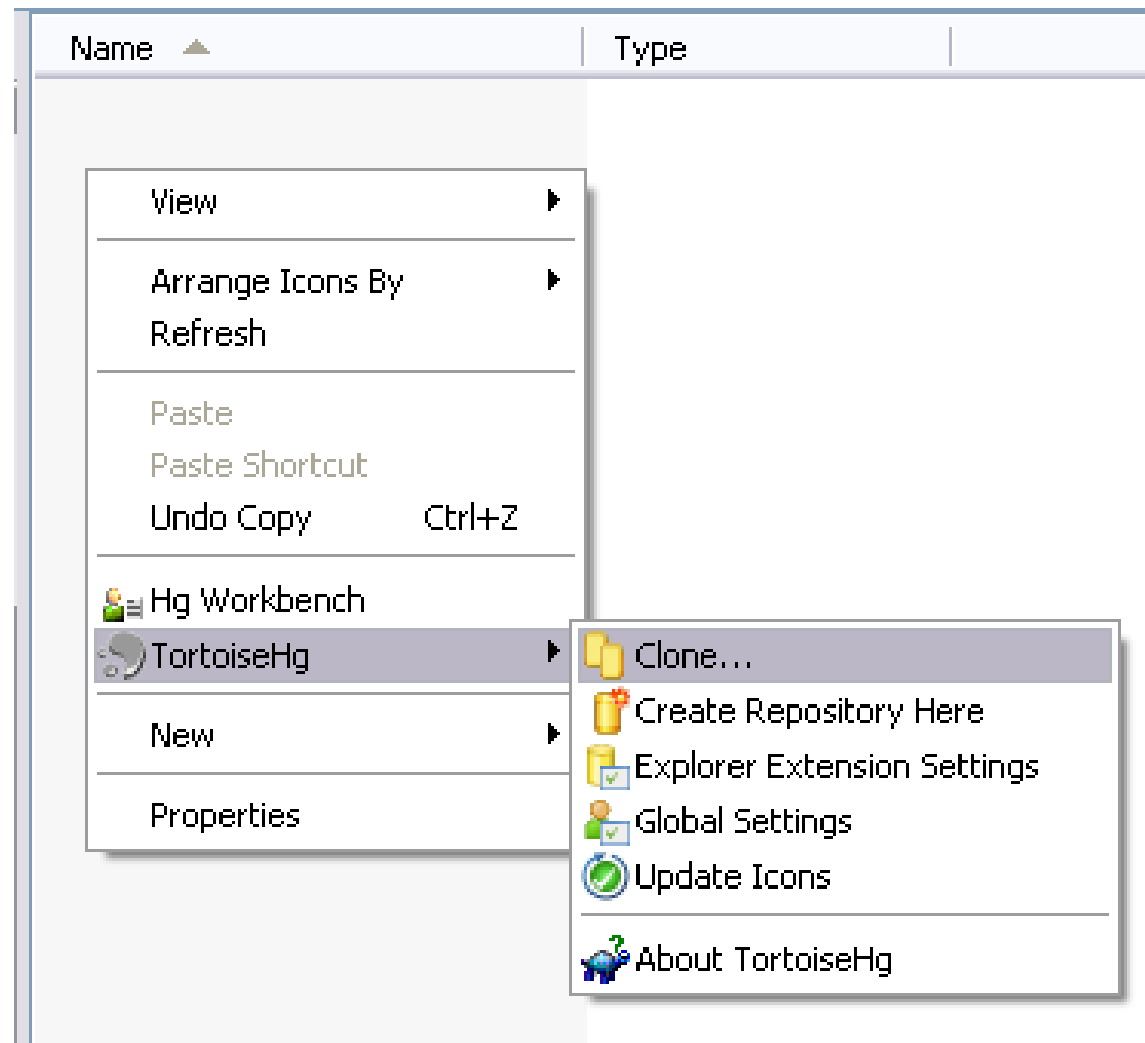
Output Log

web_new%

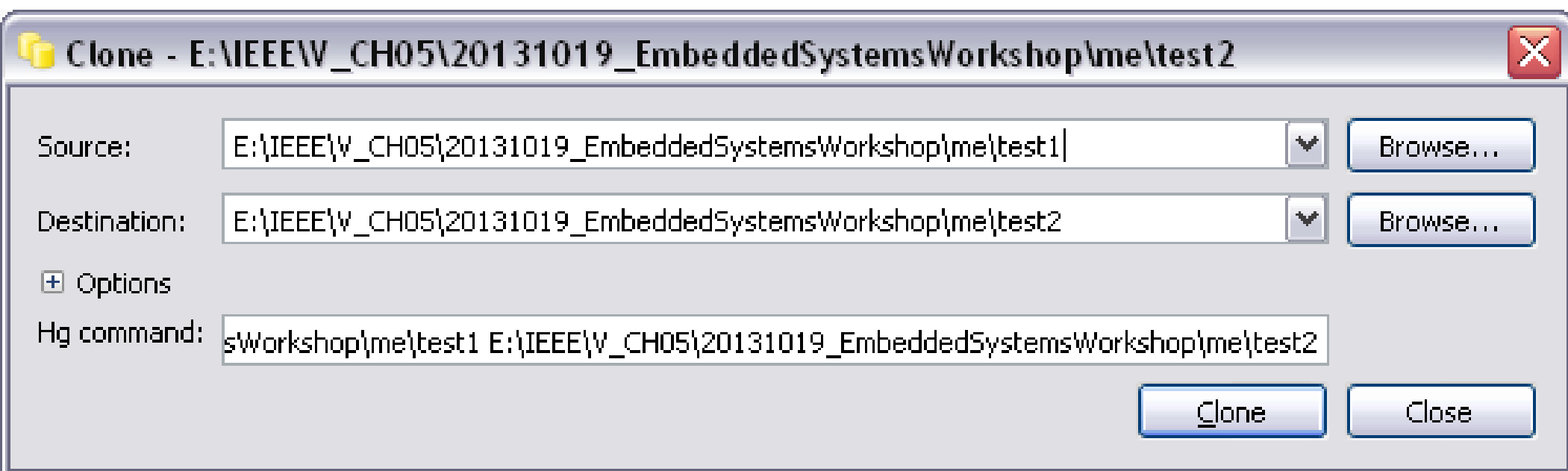
Linux Command-Line

- hg init
- hg add
- hg stat
- hg commit
- hg log
- hg clone
- hg branch
- hg update

hg clone



hg clone





Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	1	default	tip	default tip Added beginnings of ISR and a background	Mark Ciechanowski, P.E., CSDP	2 seconds
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	31 minutes

filter text

Branch: default Copy message Options

Commit

*	Filename	Type	Size (KB)
	? .hgignore		0
	? .template.cpp.swp swp		12

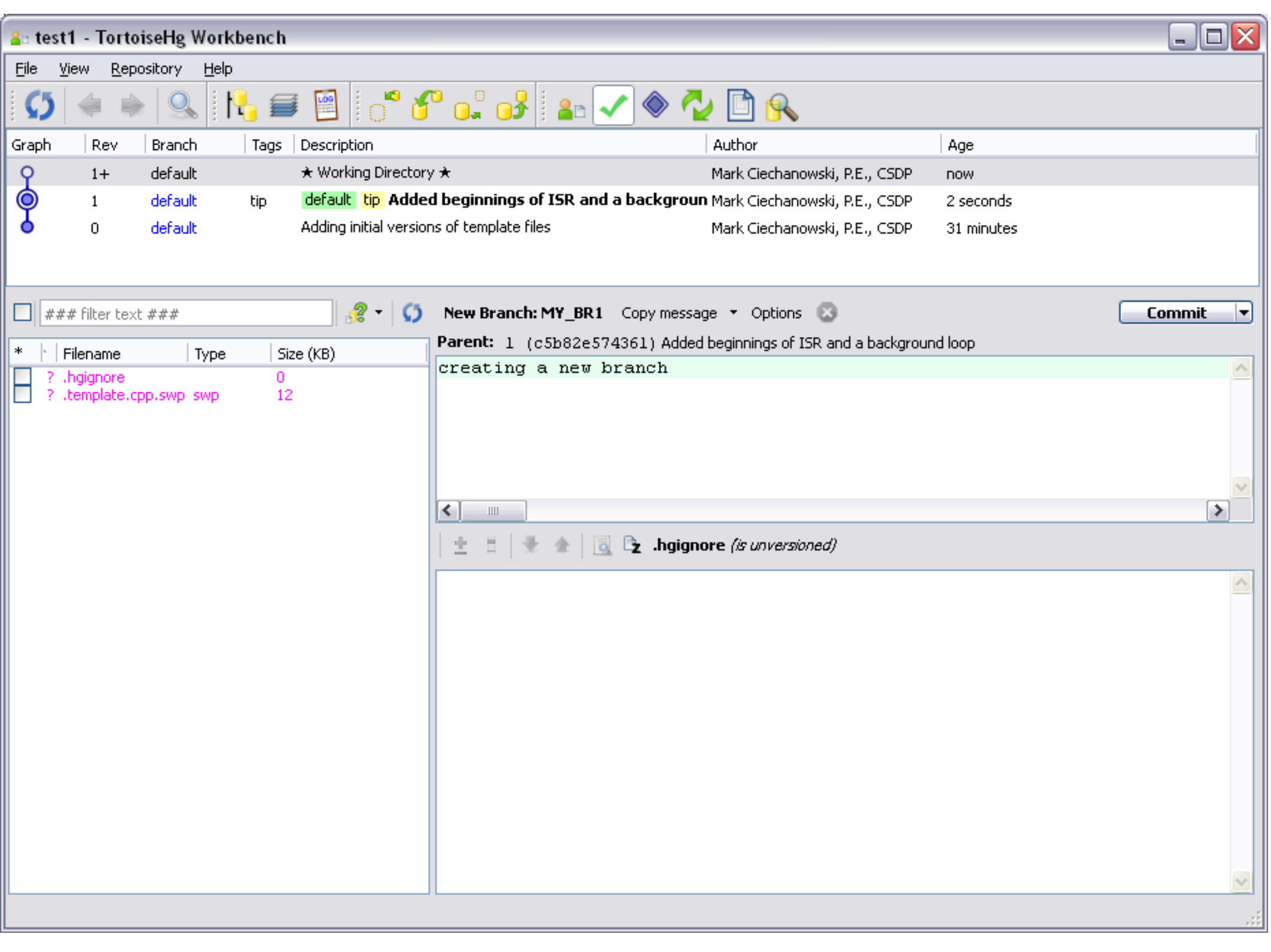
Parent: 1 (c5b82e574361) Added beginnings of ISR and a background loop

test1 - branch operation

Changes take effect on next commit

- No branch changes
- Open a new named branch MY_BR1
- Close current branch

OK Cancel



Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	1	default	tip	default tip Added beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	2 seconds
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	31 minutes

filter text

New Branch: MY_BR1 Copy message Options

Commit

*	Filename	Type	Size (KB)
<input type="checkbox"/>	? .hgignore		0
<input type="checkbox"/>	? .template.cpp.swp	swp	12

Parent: 1 (c5b82e574361) Added beginnings of ISR and a background loop
creating a new branch

.hgignore (is unversioned)



Graph	Rev	Branch	Tags	Description	Author	Age
	2+	MY_BR1		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	2	MY_BR1	tip	MY_BR1 tip creating a new branch	Mark Ciechanowski, P.E., CSDP	2 seconds
	1	default		default Added beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	17 minutes
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	49 minutes

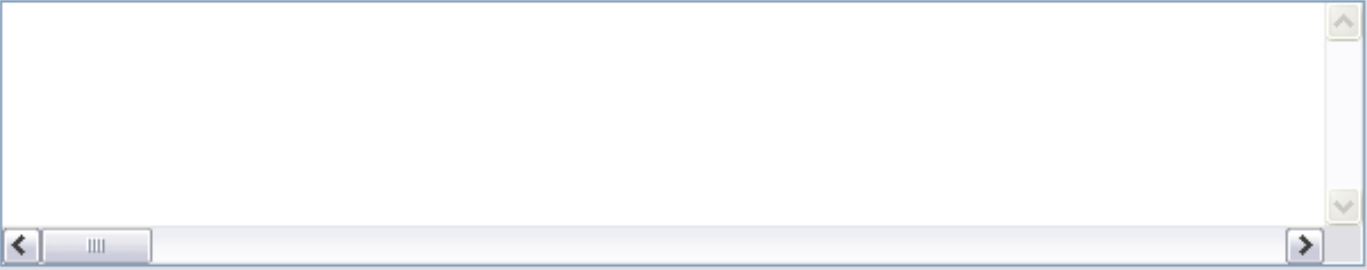
filter text

New Branch: MY_BR1 Copy message Options

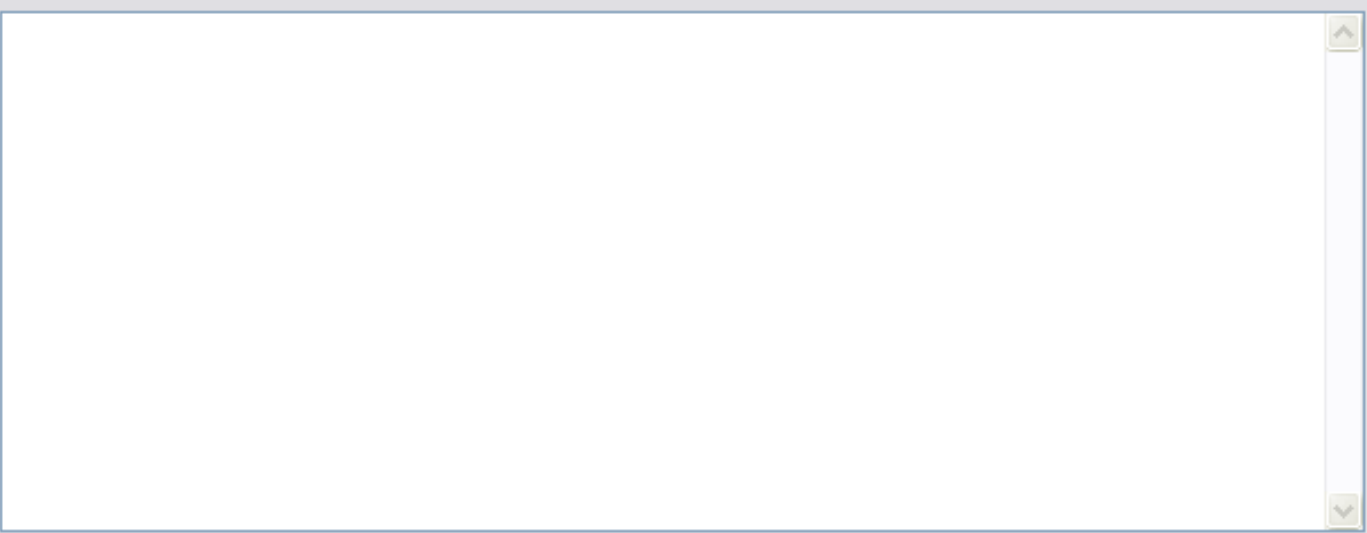
Commit

*	Filename	Type	Size (KB)
<input type="checkbox"/>	? .hgignore		0

Parent: 2 (21eb5e4fa317) creating a new branch



.hgignore (is unversioned)





Graph	Rev	Branch	Tags	Description	Author	Age
	2+	MY_BR1		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	2	MY_BR1	tip	MY_BR1 tip creating a new branch	Mark Ciechanowski, P.E., CSDP	2 seconds
	1	default		beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	17 minutes
	0	default		sions of template files	Mark Ciechanowski, P.E., CSDP	49 minutes

- Update...
- Visual diff...
- Diff to local...
- Browse at rev...
- Merge with local...
- Tag...
- Bookmark...
- Backout...
- Export
- ## Copy hash
- Modify history

Changeset: 1 (c5b82e574361) Added beginnings of ISR and a background loop
User: Mark Ciechanowski, P.E., CSDP <markc@dgtech.com>
Date: 2013-10-18 18:52:45 -0400 (18 minutes)
Parent: [0 \(7163ed80203e\)](#) Adding initial versions of template files
Child: [2 \(21eb5e4fa317\)](#) MY_BR1 creating a new branch

Added beginnings of ISR and a background loop

Show All

template.cpp

template.cpp

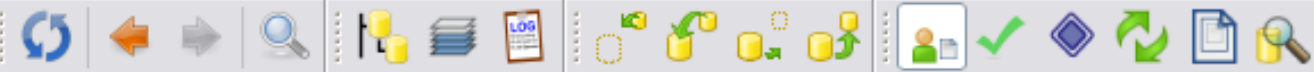
```

-30,12 +30,30 @@
 */
+
+ * isr
+ */
+__interrupt void ISR(void)
+{
+    unsigned int uiFlags;
+    while(uiFlags = (FLAG_REG & mask)) {
+        // ...
+    }
+    INT_REG = CLEAR;
+}

```

test1 - TortoiseHg Workbench

File View Repository Help



Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	2	MY_BR1	tip	MY_BR1 tip creating a new branch	Mark Ciechanowski, P.E., CSDP	2 minutes
	1	default		default Added beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	19 minutes
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	51 minutes

Show All

template.cpp

Changeset: 1 (c5b82e574361) Added beginnings of ISR and a background loop


User: Mark Ciechanowski, P.E., CSDP <markc@dgtech.com>

Date: 2013-10-18 18:52:45 -0400 (19 minutes)

Parent: [0 \(7163ed80203e\)](#) Adding initial versions of template files

Child: [2 \(21eb5e4fa317\)](#) MY_BR1 creating a new branch


Added beginnings of ISR and a background loop

 **template.cpp**

```

@@ -30,12 +30,30 @@
 */
 /*
+ * isr
+ */
+__interrupt void ISR(void)
+{
+    unsigned int uiFlags;
+    while(uiFlags = (FLAG_REG & mask)) {
+        // ...
+    }
+    INT_REG = CLEAR;
+}
+


```

Graph	Rev	Branch	Tags	Description	Author	Age
	1+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	2	MY_BR1	tip	MY_BR1 tip creating a new branch	Mark Ciechanowski, P.E., CSDP	13 hours
	1	default		default Added beginnings of ISR and a background lo	Mark Ciechanowski, P.E., CSDP	13 hours
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	13 hours

filter text ###  Branch: default Copy message Options  **Commit**

* <input type="checkbox"/>	Filename	Type	Size (KB)
<input checked="" type="checkbox"/>	M template.cpp	cpp	2
<input type="checkbox"/>	? .hgignore		0
<input type="checkbox"/>	? .template.cpp.swp	swp	12

Parent: 1 (c5b82e574361) Added beginnings of ISR and a background loop
added Rx and Tx, on default branch

 **template.cpp**

```
00 -53,6 +53,10 00
    while(1) {
        ret = check_status();
        // ...
+       ret = process_receive_data();
+       // ...
+       ret = send_transmit_data();
+       // ...
    }

    return(0);
```




Graph	Rev	Branch	Tags	Description	Author	Age
	3+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	3	default	tip	default tip added Rx and Tx, on default branch	Mark Ciechanowski, P.E., CSDP	2 seconds
	2	MY_BR1		MY_BR1 creating a new branch	Mark Ciechanowski, P.E., CSDP	13 hours
	1	default		Added beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	13 hours
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	13 hours

filter text ### **Branch: default** Copy message ▾ Options **Commit** ▾

*	Filename	Type	Size (KB)
<input type="checkbox"/>	? .hgignore		0
<input type="checkbox"/>	? .template.cpp.swp	swp	12

Parent: 3 (111556d39755) added Rx and Tx, on default branch

.hgignore (is unversioned)



Graph	Rev	Branch	Tags	Description	Author	Age
	3+	default		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	3	default	tip	default tip added Rx and Tx, on default branch	Mark Ciechanowski, P.E., CSDP	2 seconds
	2	MY_BR1		MY_BR1 creating a new branch	Mark Ciechanowski, P.E., CSDP	13 hours
	1	default		beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	13 hours
	0	default		versions of template files	Mark Ciechanowski, P.E., CSDP	13 hours

- Update...
- Visual diff...
- Diff to local...
- Browse at rev...
- Merge with local...
- Tag...
- Bookmark...
- Backout...
- Export
- ## Copy hash
- Modify history

Show All

Changeset: 2 (21eb5e4fa317) creating a new branch
Branch: MY_BR1
User: Mark Ciechanowski, P.E., CSDP <markc@dgtech.com>
Date: 2013-10-18 19:10:06 -0400 (13 hours)
Parent: [1 \(c5b82e574361\)](#) default Added beginnings of ISR and a background loop

creating a new branch



Empty text area for file content or diff output.



Graph	Rev	Branch	Tags	Description	Author	Age
	2+	MY_BR1		★ Working Directory ★	Mark Ciechanowski, P.E., CSDP	now
	3	default	tip	default tip added Rx and Tx, on default branch	Mark Ciechanowski, P.E., CSDP	2 minutes
	2	MY_BR1		MY_BR1 creating a new branch	Mark Ciechanowski, P.E., CSDP	13 hours
	1	default		Added beginnings of ISR and a background loop	Mark Ciechanowski, P.E., CSDP	13 hours
	0	default		Adding initial versions of template files	Mark Ciechanowski, P.E., CSDP	13 hours

filter text



Branch: MY_BR1 Copy message Options

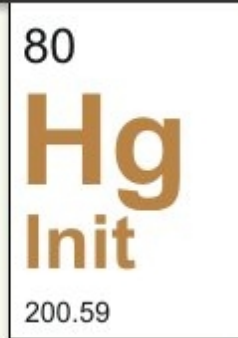
Commit

*	Filename	Type	Size (KB)
<input type="checkbox"/>	? .hgignore		0

Parent: 2 (21eb5e4fa317) creating a new branch

.hgignore (is unversioned)

Tutorial



Hg Init: a Mercurial tutorial

- www.hginit.com

References



- **HgInit** <http://www.hginit.com>
- **SWEBOK** **IEEE** **Computer Society** 2004
<http://www.swebok.org>
- Configuration Management
- Further Information on Technology and Careers
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