

ITdevCon

European Delphi Conference

14, 15 november 2013 - VERONA (Italy)

Continuous integration, delivery and deployment

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Quick poll

Safe?

Are you using version control?

Quick?

Can you release new version of your software in one day?

Quick and safe?

Can you release new, **well-tested** version of your software in one day?

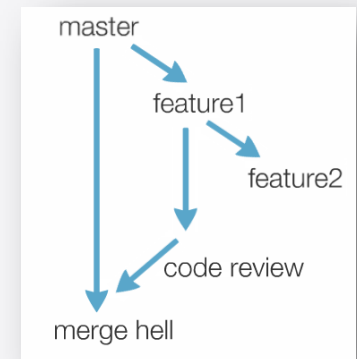
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Development now

- Each developer has feature branches
 - *If* the version control is used at all
- Features are deployed when completed
- Integration issues
- Small test suite



- Bringing software into production is hard
- Takes a lot of time
- Error prone



Solution – Continuous Integration

Continuous Integration?

*“Continuous Integration is a software development practice where members of a team **integrate** their work **frequently**, usually each person integrates **at least daily** - leading to multiple integrations per day. Each integration is **verified** by an **automated build** (including test) to detect integration errors as quickly as possible.”*

- Martin Fowler

Change the workflow!

- Checkout/update
- Code
- Build & test locally
- Update (merge)
 - Retest if changed
- Commit
- Continuous Integration server takes over ...

Change the versioning!

- No 'feature' branches
- Temporary 'developer' branches
- Good to test crazy ideas
 - Branch and throw away
- Trunk must always compile
- Avoid big scary merges



- No 'feature' branches
- Features can be toggled on and off via deployment or compilation configuration
 - Also helps with Continuous Delivery/Deployment
- Keep features small
- Improve features interactively
 - Introduce early, then improve

Sidenote – Version control systems

- History
 - Log
 - Blame
- Revert to version
 - Bug-finding tool
- Branches
 - Tag/mark every release
- Always use VCS – even for single-person projects!

Log

X:\ms - Log Messages - TortoiseSVN

Filter by Messages, Paths, Authors, Revisions, Bug-IDs, Date, Date Range					From:	16.10.2013	To:
Revision	Actions	Author	Date	Message			
11680		istvan	8. november 2013 18:28:03	* TMainSTTWINForm.MyException first logs the exception, then does everything else so we always get a log file * printing			
11679		primoz	8. november 2013 16:14:05	+ backup (working on connections)			
11677		iztok	8. november 2013 15:59:45	* Updated Subtitler ribbon			
11676		iztok	8. november 2013 15:57:27	* Horizontal alignment for ARD-TT import is working * Updated Subtitler ribbon * Changed icons			
11673		build	7. november 2013 19:38:20	FT-SUBTITLER 7.79			
11672		miha	7. november 2013 19:06:59	* STTWIN Version 7.79			
11670		iztok	7. november 2013 17:03:44	+ Added import of ARD-TT xml subtitle file (colors not working yet)			
11669		primoz	7. november 2013 16:47:42	! corrected cursor positioning and writing outside of margins ! ctrl+q now closes page if it is empty and contains no subpag			
11668		primoz	7. november 2013 16:39:52	! ClipSelToMargins also regulates cursor positioning when not in FSubtitle mode			
11667		primoz	7. november 2013 16:30:09	! changed parameter order (code is only used in Ettwin)			
11666		peter	7. november 2013 16:00:07	! Another bugfix.			
11665		peter	7. november 2013 15:41:43	! No Range check on ATC reading.			
11664		istvan	7. november 2013 13:36:12	* updated automation test xml files * using a CS in DirectShowFeeder around FLastPacket * better handling of stopping au			
11663		miha	7. november 2013 13:08:54	! FXP XML Export writes alignment into correct XML node			
11662		build	7. november 2013 9:36:19	FT-SUPPORT 1.53			
11660		primoz	7. november 2013 9:27:40	FAB System Report 1.53			
11658		peter	7. november 2013 1:17:37	+ Detect whether DPPI is running under hypervisor.			
11657		miha	6. november 2013 23:18:35	+ justification is exported to FCP XML (including dialogue justification)			
11656		miha	6. november 2013 17:08:12	+ computername and all IP addresses are written into fab.txt			
11655		primoz	6. november 2013 14:12:34	+ connections can be configured			
11654		istvan	6. november 2013 13:29:23	* delete files is displayed correctly in web view ! Status was updated only for XmlCommandsHandler * if no subtitles can be			
11650		iztok	5. november 2013 17:11:38	* Updated Subtitler ribbon + Added new icons			
11649		primoz	5. november 2013 15:...	+ backup			
11648		primoz	5. november 2013 15:09:15	+ default editor font can be set			
11647		primoz	5. november 2013 14:43:41	+ page options for new page can be set			
11646		primoz	5. november 2013 9:47:47	! corrected cursor movement			
11645		primoz	5. november 2013 9:39:02	! only ask 'save' question once per window on app shutdown ! 'save' question displays window caption + refactored IewW			
11643		primoz	5. november 2013 8:52:52	! fixed a problem with 'dirty' flag being set on page load			
11642		istvan	4. november 2013 17:22:31	* speech controls are enabled if speech is turned on * speech mode layout code cleaned up			
11641		iztok	4. november 2013 17:20:57	+ Added font Tiresias to ARD-TT export default style * Changed ARD-TT export default style (fontSize to 160% and lineH			
11639		miha	4. november 2013 17:15:31	* MLOAD.PAS, MLUtil1.pas and ESUBXF.pas compile with BP + MSWDOG.PAS: allows for procedure which is called in timer			
11638		primoz	4. november 2013 17:00:01	+ save & load are mostly working and are compatible with the old behaviour !! loadFromDisk did not return correct TTTFE			

Blame

X:\gp\common\GpMXF.pas : 1-11642 - TortoiseBlame - TortoiseSVN

File Edit View

X:\gp\common\GpMXF.pas : 1-11642

Revision	Author	Line
677	peter	1009
4700	istvan	1010 TMXFVideoType = (mvtMpeg1, mvtMpeg2, mvtMpeg4, mvtD10, mvtDV, mvtRGB);
2392	istvan	1011
9553	istvan	1012 TMXFDataTrackType = (mttS436M_VBI, mttS436M_ANC, mttRDD9_VBI, mttRDD9_ANC, mttS410_SUBXF);
9060	istvan	1013
8	primoz	1014 TMXFVideoInfo = record
8	primoz	1015 AspectRatio_H : integer;
8	primoz	1016 AspectRatio_V : integer;
8	primoz	1017 DisplayHeight : integer;
8	primoz	1018 DisplayWidth : integer;
8	primoz	1019 DisplayXOffset : integer;
8	primoz	1020 DisplayYOffset : integer;
8	primoz	1021 Dropframe : boolean;
8	primoz	1022 Duration_f : int64;
2936	istvan	1023 DurationActual_f : int64;
3991	istvan	1024 Errors : TMXFErrorInfoArray;
8	primoz	1025 EstimatedGOPFrames : int64;
8	primoz	1026 EstimatedNumFrames : int64;
8	primoz	1027 FrameRate : real;
2875	istvan	1028 HasANCDATATrack : boolean;
6401	istvan	1029 HasVBIDATATrack : boolean;
8	primoz	1030 IsD10 : boolean;
677	peter	1031 IsDV : boolean;
2392	istvan	1032 IsLongGOP : boolean;
10784	miha	1033 LastProducer : String;
8	primoz	1034 MpegData : TMpegFrameData;
8	primoz	1035 MpegDataPresent : boolean;
8	primoz	1036 PECPresent : boolean;
8	primoz	1037 StartTimeCode_f : int64;
8	primoz	1038 StoredHeight : integer;
8	primoz	1039 StoredWidth : integer;
8	primoz	1040 TimecodeBase : word;
2936	istvan	1041 TimecodePresent : boolean;
8	primoz	1042 VideoAFD : integer;
2392	istvan	1043 VideoType : TMXFVideoType;
8	primoz	1044 end; { TMXFVideoInfo }
8	primoz	1045
8	primoz	1046 TMXFKey = (kyInvalid,
9553	istvan	1047 kyHeaderPartition, kyBodyPartition, kyFooterPartition, kyFiller, kyPrimerPack, kyPreface,
8089	istvan	1048 kyRandomIndexPack, kyIndexTableSegment, kyMetadata, kyControlData, kySystemMetadata,
8089	istvan	1049 kyIdentification, kyMaterialPackage, kySourcePackage, kyContentStorage,
8089	istvan	1050 kyTrack, kyEventTrack, kyStaticTrack,
8089	istvan	1051 kySequence, kySourceClip, kyTimecodeComponent,
8089	istvan	1052 kyEscapeContainerData, kyEscape, kyMultipleDescriptor, kyFileDescriptor,

- Automate everything
 - If it hurts, do it more often. Continuously.
 - Fail fast.
- Integration testing
- Unit testing
- Functional testing
- Application testing
- Mobile testing
- Whatever you don't test against, **will** happen

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Requirements

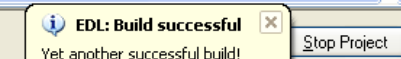
- Source code repository (version control)
 - SVN, Git, Mercurial, ...
- Project build
 - MSBuild
 - ...
- Testing
- Continuous Integration server

CI server in essence

```
while true do
begin
    if change_checked_into_vcs then
    begin
        if not build then
            report_error;
        if not test then
            report_error;
    end;
    sleep;
end;
```

- Jenkins
 - Hudson fork
 - Java
 - Commercial support - Cloudbees
- CruiseControl.Net
 - C#
 - XML configuration :(
- FinalBuilder, Automated Build

```
<cruisecontrol xmlns:cb="urn:ccnet.config.builder" xmlns="http://thoughtworks.org/ccnet/1/6">
  <cb:define name="fabsvn">
    <sourcecontrol type="filtered">
      <sourceControlProvider type="svn">
        <trunkUrl>svn://srv2.de.fab-online.com/fabttx/</trunkUrl>
        <workingDirectory>c:\build\trunk\</workingDirectory>
        <executable>c:\Program Files\TortoiseSVN\bin\svn.exe</executable>
        <username>build</username>
        <password>builder%12</password>
        <revert>False</revert>
        <forceUpdate>True</forceUpdate>
        <tagOnSuccess>False</tagOnSuccess>
        <timeout units="Minutes">15</timeout>
      </sourceControlProvider>
    <exclusionFilters>
      <pathFilter>
        <pattern>/fabttx/branches/**</pattern>
      </pathFilter>
      <pathFilter>
        <pattern>/fabttx/tags/**</pattern>
      </pathFilter>
      <pathFilter>
        <pattern>/fabttx/common/config/**/*</pattern>
      </pathFilter>
    </exclusionFilters>
  </cb:define>
</cruisecontrol>
```



- Use a separate server (or VM)
 - For CI, or
 - For CI + build, or
 - For CI + build + test

- Build early, build often
 - On every checkin
 - Check in early, check in often

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Benefits

- Brings order into chaos
- Everything could be achieved without the Continuous Integration, but ...
- CI is the great enforcer

- Code is always in the consistent state
- Code always compiles
- Automatic tests
- Automatic feedback on production readiness

Code always compiles



I PITY 'DA FOOL

WHO BREAKS THE BUILD

Code always compiles

- Code should **always** build and test.
 - Continuous Delivery

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Continuous Delivery

“The essence of my philosophy to software delivery is to build software so that it is **always** in a **state** where it could be put into **production**. We call this *Continuous Delivery* because we are continuously running a *deployment pipeline* that tests if this software is in a state to be delivered.”

– Jez Humble, Thoughtworks

- CD = CI + fully automated test suite
- Not every change is a release
 - Manual trigger
 - Trigger on a key file (version)
 - Tag releases!
- CD – It is all about testing!

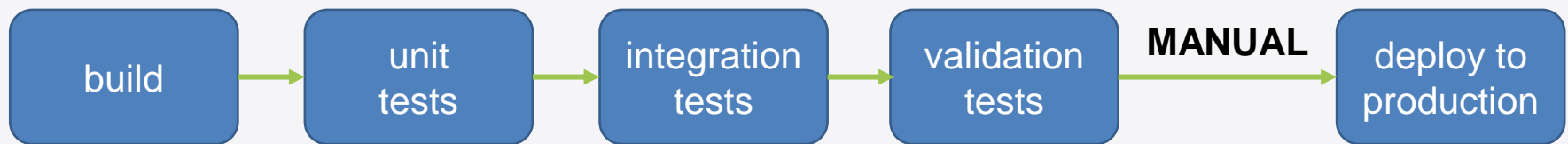
Consider this

“How long would it take your organization to deploy a change that involves just one single line of code?”

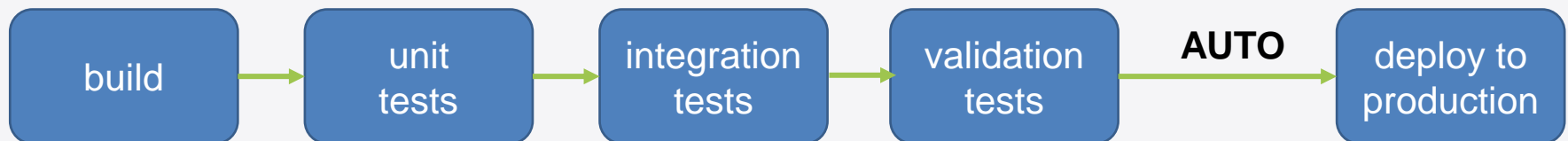
- Mary and Tom Poppendieck,
Implementing Lean Software Development

Cont. Delivery vs. Deployment

Continuous Delivery



Continuous Deployment





Continuous Deployment

Continuous Deployment



A word of warning

- Continuous delivery is doable.
- Continuous deployment is a hard problem.

Deployment schedule

- Release when a feature is complete
- Release every day

- Zero-downtime deployment (and rollback)
- Blue-green
 - Two environments
 - Install on one. Switch. Switch back on problems.
- Canary release
 - Deploy to subset of servers
- Real-time application state monitor!

- Technical
 - Databases
 - Schema migration
 - Revert!
 - Change management software
 - Configuration
- Human
 - Even more important
 - Automatic deployment = great fear
 - Customers don't want software to constantly change

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Transition

- Gain expertise
 - First step accomplished – you are here
- Automate the build
- Introduce tests
- Prove the concept
 - Introduce CI system
 - Run it in parallel to existing infrastructure
 - Give it time
 - Show the win-win

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Notes from the field

- Continuous Integration is relatively easy
 - It is all about communication
- Continuous Delivery is harder (but we are getting there)
 - Some things are hard to test automatically
 - You need dedicated tests-writing people
- Continuous Deployment is not a requirement
 - Customers don't want it
 - Mission critical systems

Sidenote - VCS rules!

- Disks are large, store as much as possible in the VCS
- Continuous Integration server configuration should be stored in the VCS
- Should be able to restore complete build system from the VCS (after installing necessary software)

- Run everything in VM
- Backup!

It is all about the people!

- Jenkins
<http://jenkins-ci.org>
- CruiseControl.NET
<http://www.cruisecontrolnet.org>
- Final Builder
<http://www.finalbuilder.com/finalbuilder.aspx>
- Automated Build Studio
<http://smartbear.com/products/>

- Continuous Delivery
<http://www.amazon.com/dp/0321601912>
- Continuous Integration
<http://www.amazon.com/dp/0321336380>
- Implementing Lean Software Development
<http://www.amazon.com/dp/0321437381>
- Release It!
<http://pragprog.com/book/mnee/release-it>

References

- http://en.wikipedia.org/wiki/Continuous_integration
- http://en.wikipedia.org/wiki/Continuous_delivery
- <http://martinfowler.com/articles/continuousIntegration.html>
- <http://continuousdelivery.com>
- <http://www.hassmann-software.de/en/continuous-integration-hudson-subversion-delphi/>
- <http://edn.embarcadero.com/article/40962>
- <http://thundaxsoftware.blogspot.com/2011/07/continuous-integration-for-your-delphi.html>
- <http://nickhodes.com/post/Getting-Hudson-set-up-to-compile-Delphi-Projects.aspx>