



DelphiDay
italian conference

Mastering Software Quality

How to improve software and source code quality in large applications



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<https://asphyre.net>



DelphiDay

italian conference

11-12 Giugno 2024
Piacenza



wintech
italia

OPEN-SOURCE PROJECTS

<https://github.com/yunkot>

Afterwarp Framework

<https://afterwarp.io>

MicroPXL (New in 2024)

<https://github.com/yunkot/MicroPXL>

Other Projects and Resources

<https://asphyre.net>



11-12 Giugno 2024
Piacenza





Software Quality Downfall

- The purpose of a software remains the same, but the software itself is becoming more complex
- The number of bugs increase and tend to accumulate with time
- Software bloat and overengineering
- Lack of proper vision in long term planning
- Failed knowledge transfer between previous and new maintainers



Bug and 'defect' finding challenge

- Time duration: one week
- Objective: identify and document all the bugs that you encounter



Our Findings...



Windows 11: Fresh install

→ Windows “Photo” application crashes...
every single time

(demonstration)

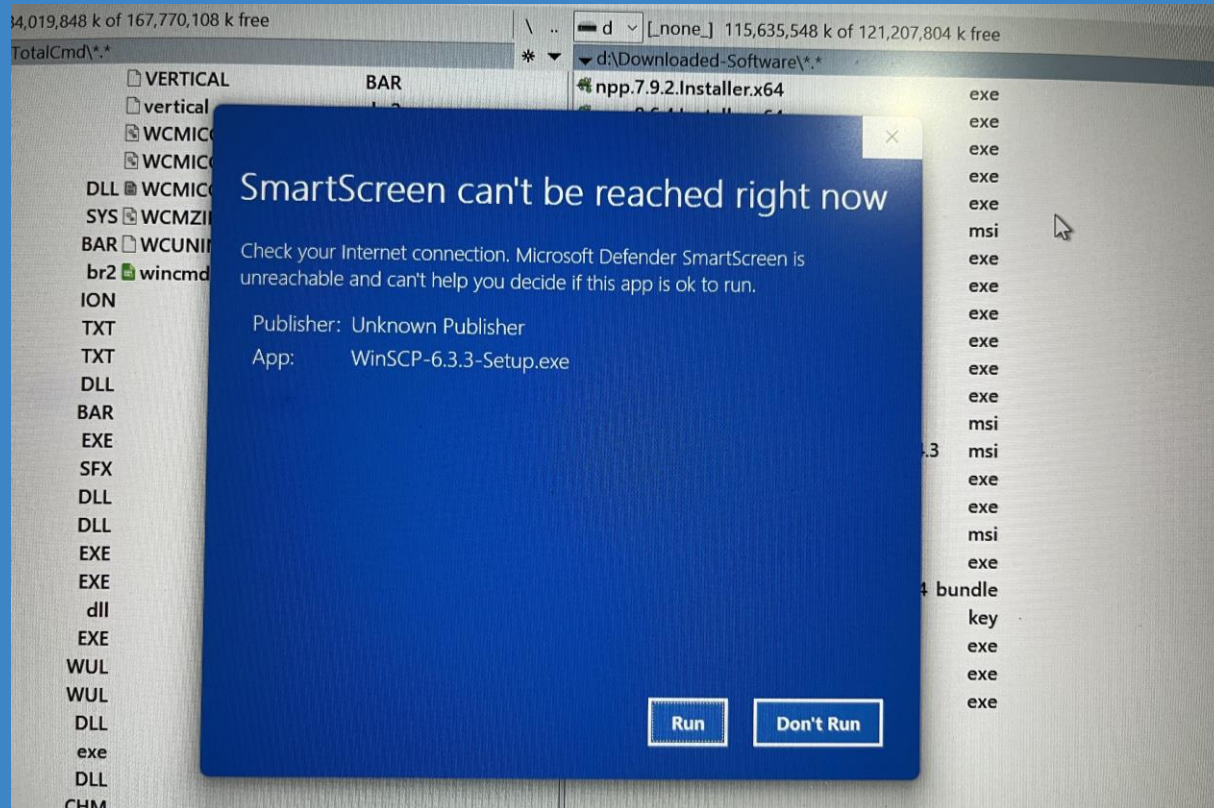


Windows 11: Fresh install

→ **LibreOffice 24.2.3.2** crashes at startup unless you run it in “safe mode” and disable Skia hardware acceleration
(laptop with an integrated and discrete GPUs)

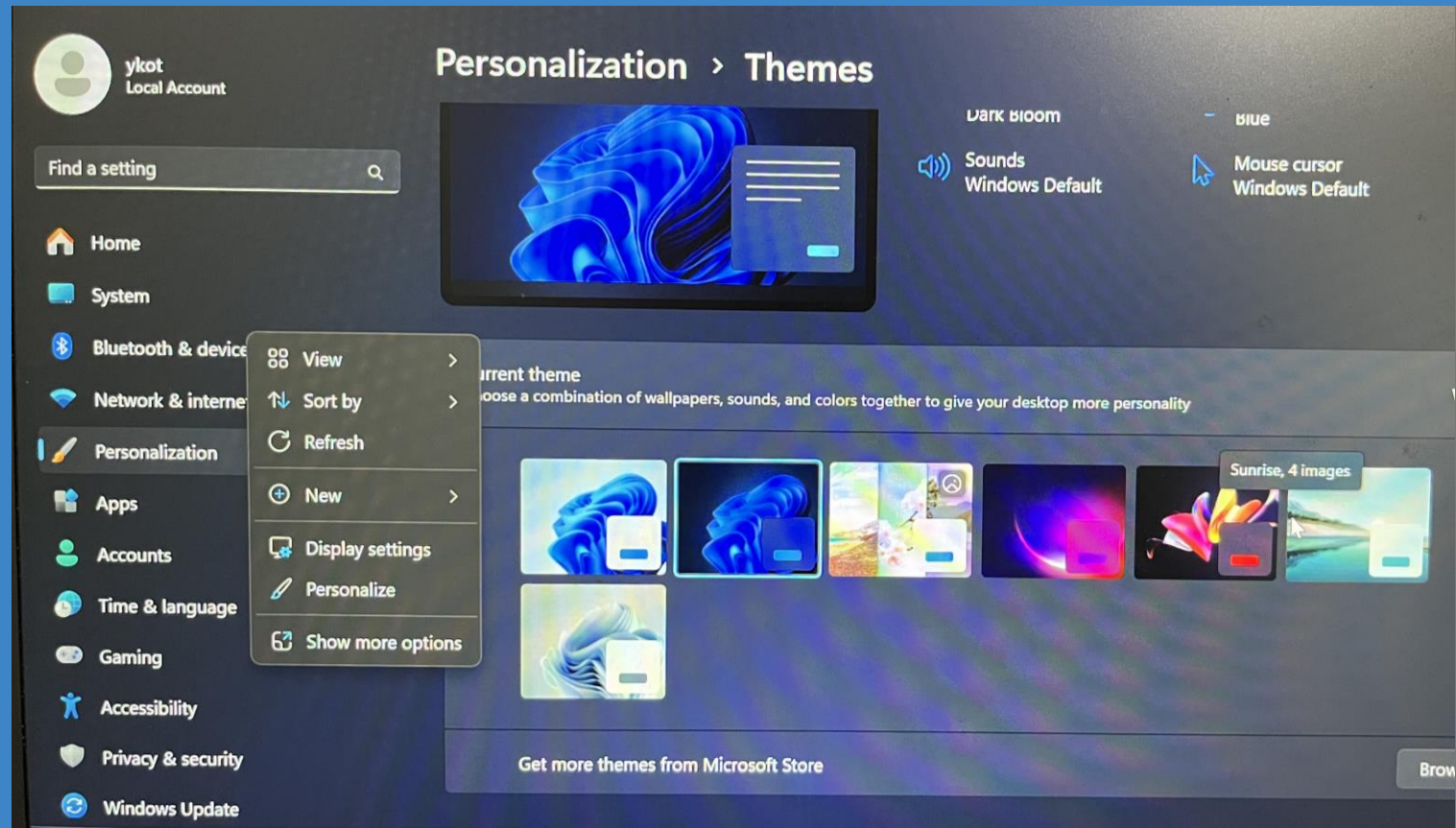


Windows 11: SmartScreen is disabled



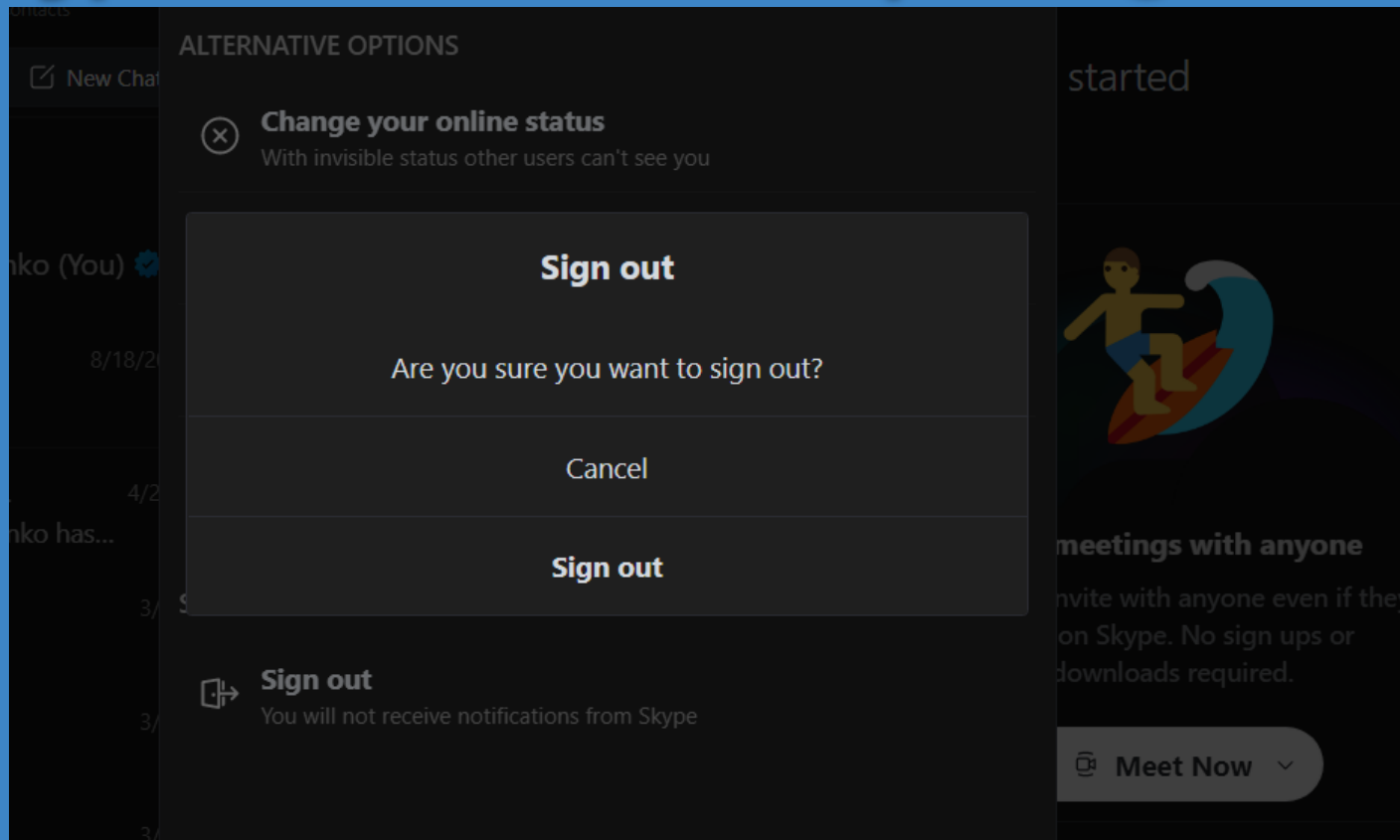


Windows 11: Show More Options



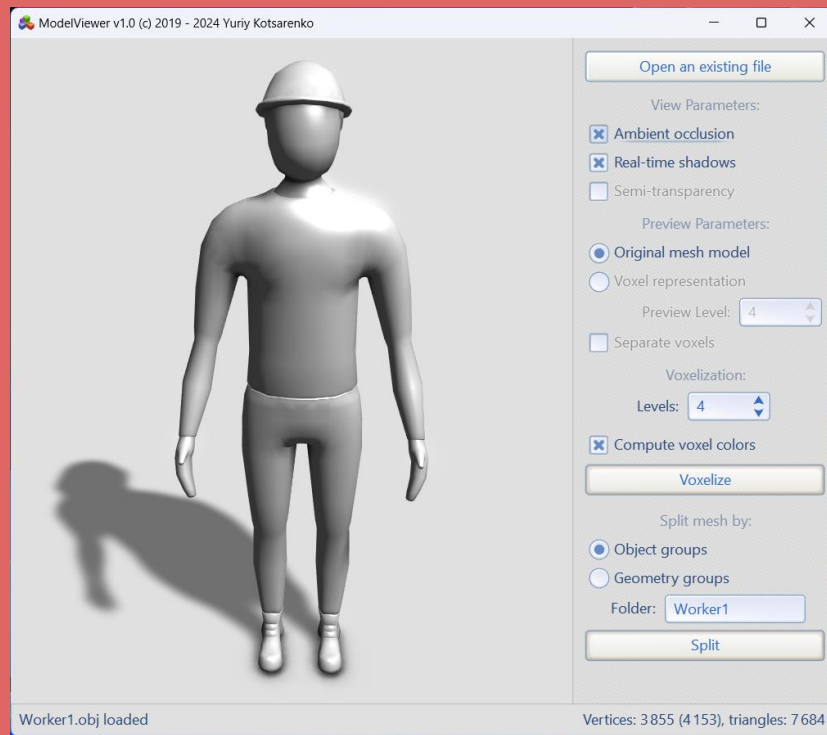
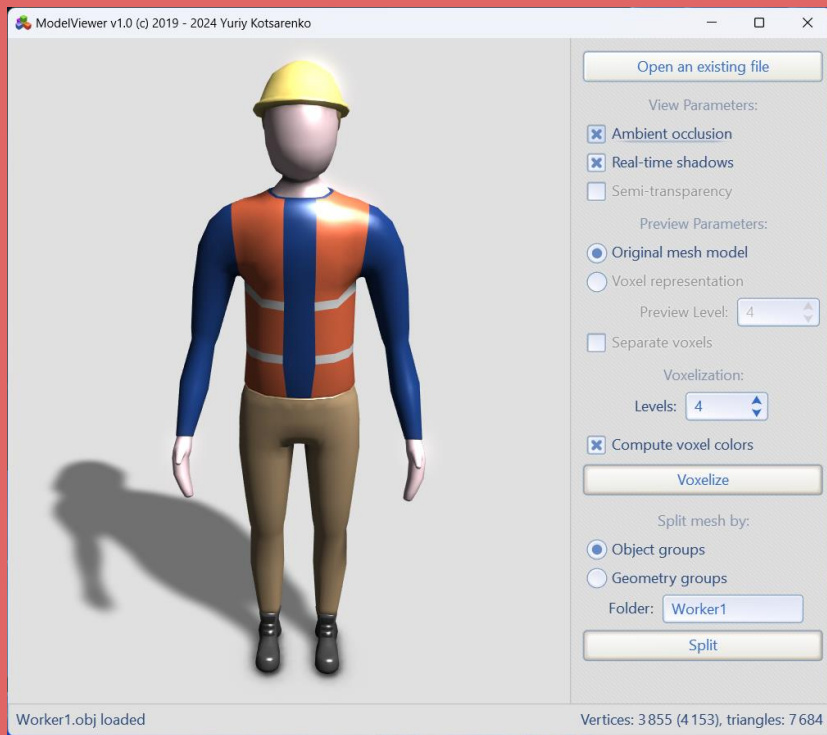


Skype for Windows 10/11: Sign out





Blender 3.4 vs Blender 4.1: exporting to OBJ file format





In Blender, model looks OK, but exports incorrectly



```
34 newmtl Brown3
35 Ns 250.000000
36 Ka 1.000000 1.000000 1.000000
37 Kd 0.800000 0.800000 0.800000
38 Ks 0.500000 0.500000 0.500000
39 Ke 0.000000 0.000000 0.000000
40 Ni 1.450000
41 d 1.000000
42 illum 2
43
44 newmtl Orange1
45 Ns 250.000000
46 Ka 1.000000 1.000000 1.000000
47 Kd 0.800000 0.800000 0.800000
48 Ks 0.500000 0.500000 0.500000
49 Ke 0.000000 0.000000 0.000000
50 Ni 1.450000
51 d 1.000000
52 illum 2
```



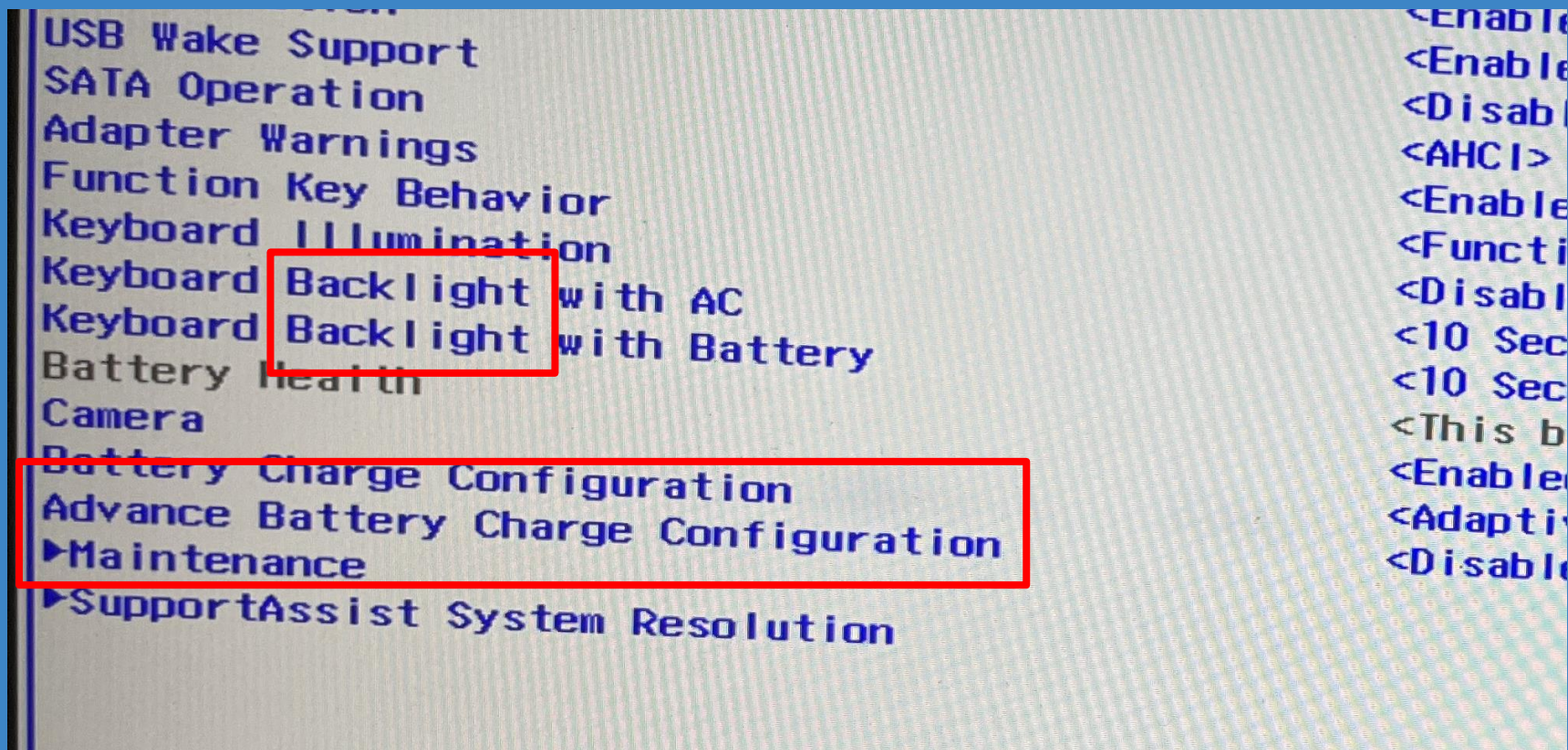
Novel type of keyboard: «backlite»

Asset Tag	
CPU Type	AMD Ryzen 7 4800H with Ra
CPU Speed	4300 MHz
CPU ID	860F0
CPU Cache	
L1 Cache	00512 KB
L2 Cache	04096 KB
L3 Cache	08192 KB
M.2 PCIe SSD	PC SN530 NVMe WDC 512GB
M.2 PCIe SSD-2	WD_BLACK SN750 SE 1TB
AC Adapter Type	<240 W>
System Memory	32768 MB
Memory Speed	3200 MHz
Keyboard Type	backlite

DELL Latitude BIOS

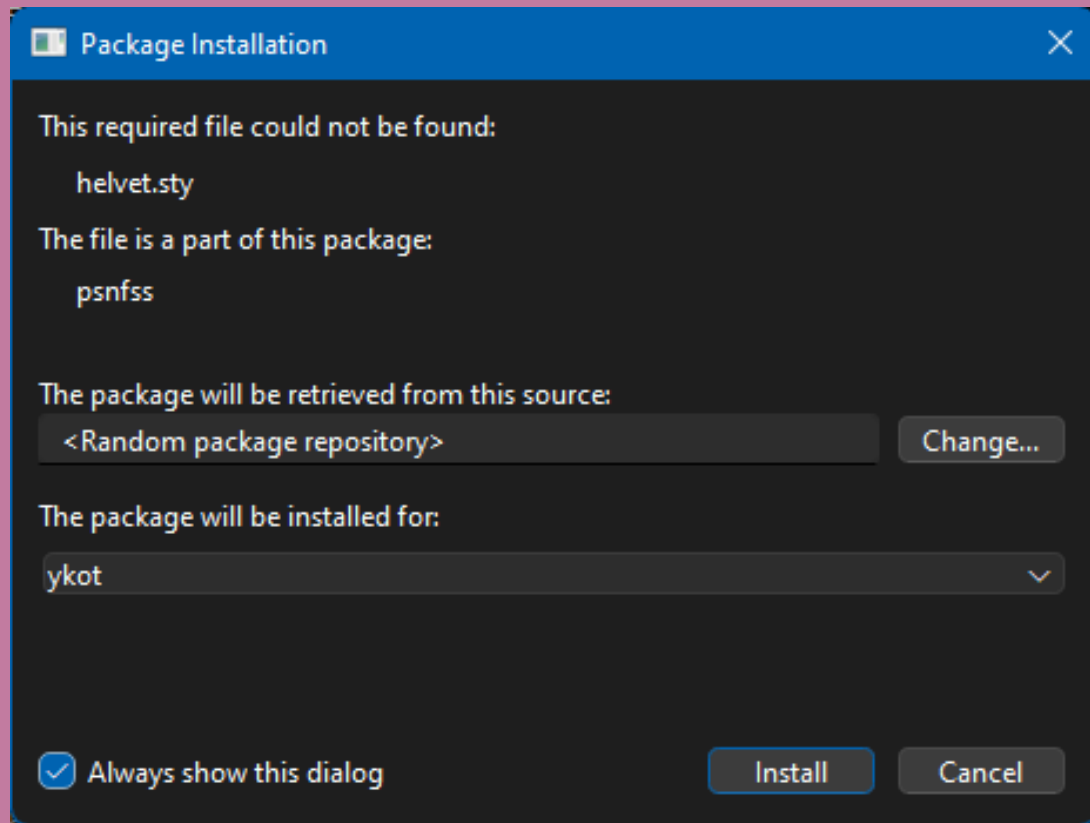


«Backlight», but «advance» without «d»



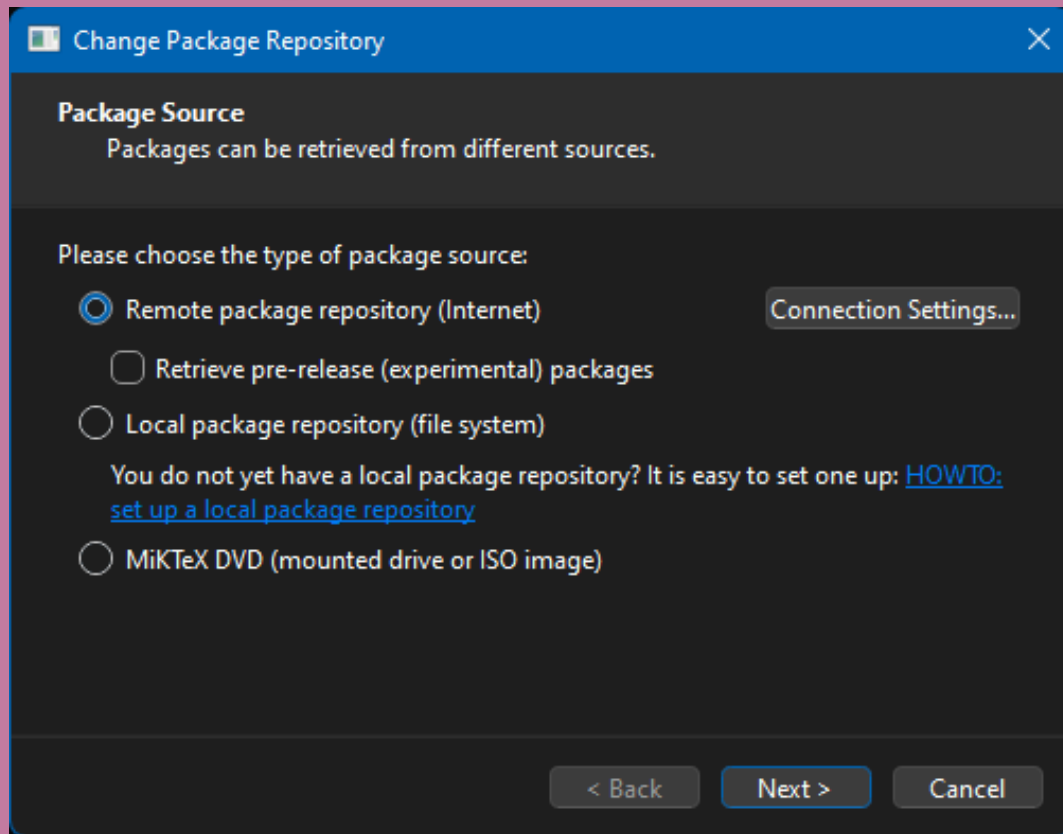


MiKTeX: «Package Installation» a million of times





HOWTO: set up a local package repository



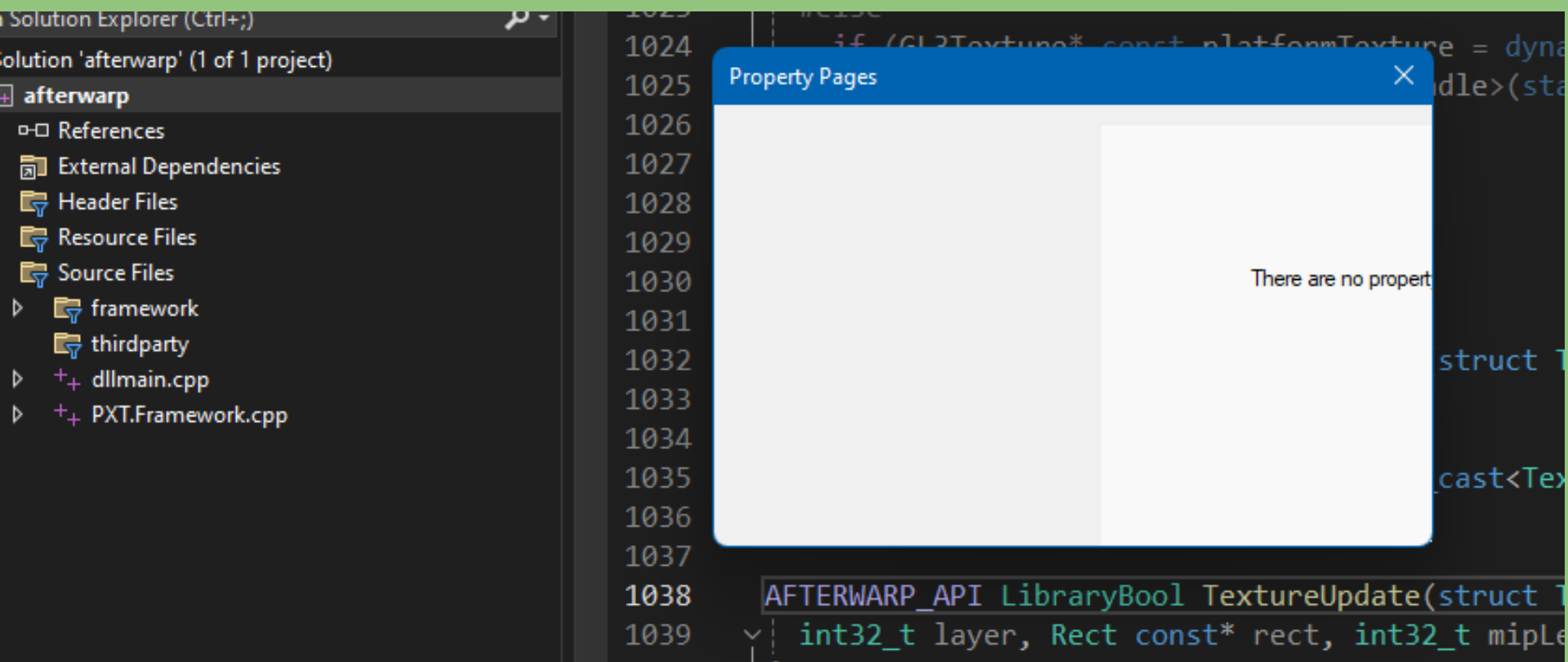


MiKTeX: can't decide what path delimiter to use

```
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/base\fontenc.sty)
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/psnfss\helvet.sty)
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/psnfss\courier.sty)
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/geometry\geometry.sty
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/generic/iftex\ifvtex.sty)
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/geometry\geometry.cfg))
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/changepage\changepage.st
y) (C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/fancyhdr\fancyhdr.sty
) (C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/natbib\natbib.sty)
(C:\Users\ykot\AppData\Local\Programs\MiKTeX\tex/latex/tocloft\tocloft.sty)
```



Visual Studio 2022: Property Pages





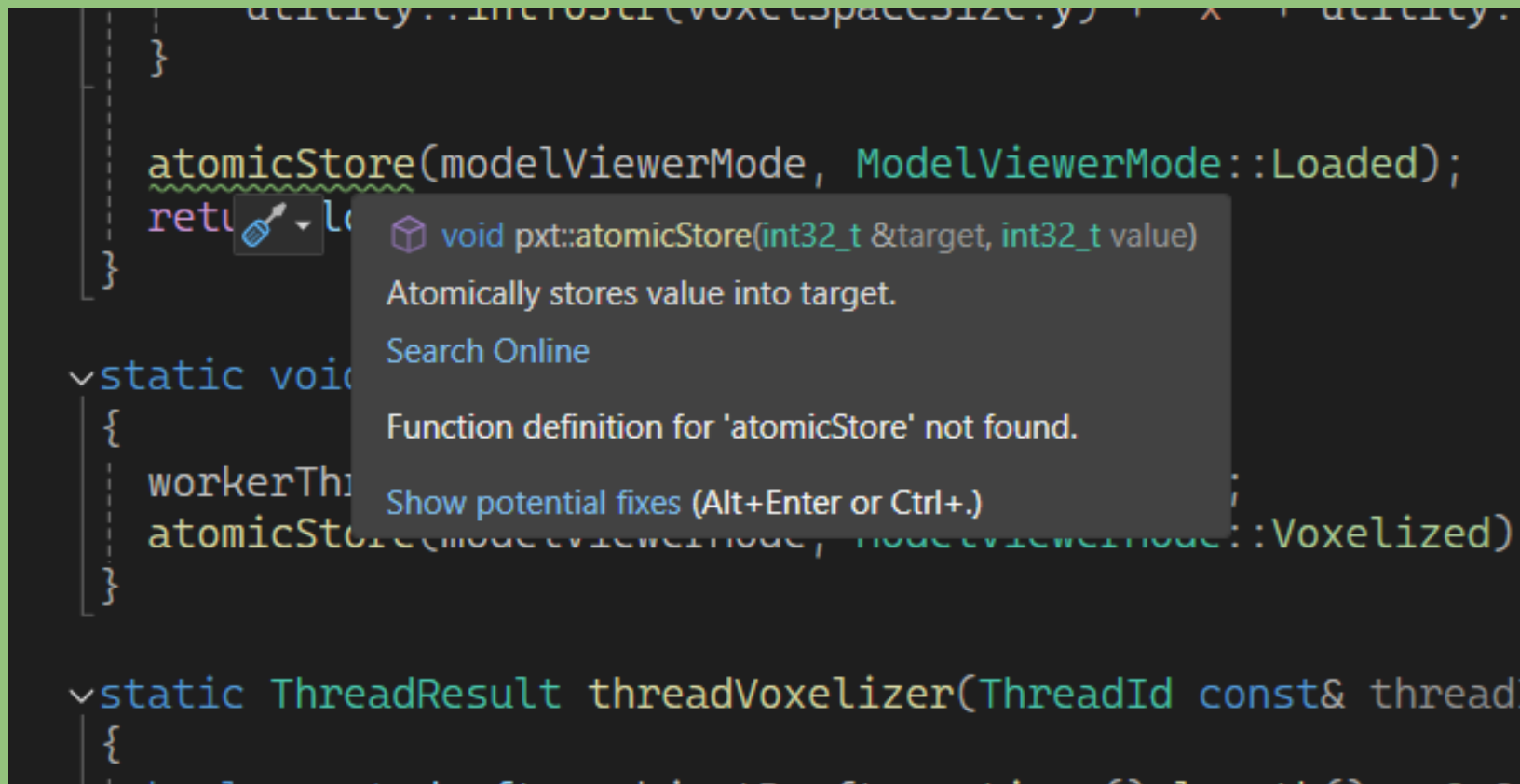
VS2022: Hallucinated parameter hint

```
utility::split(  
  
if (utility::sameText(commandLine, "quality"))  
    extraQuality = true;  
    bool split(pxt::XMLNode::FieldOrder &strings, const pxt::String &string, char separator)  
HICON const ico Splits a given string into one or more strings by given separator character. IN  
HICON const iconBig = static_cast<HICON>(LoadIcon(InitInstance, MAKEINTRESOURCE(
```

```
/// Splits a given string into one or more strings by given separator character.  
extern bool split(Array<String>& strings, String const& string, char separator);  
}
```




VS2022: Can't find my function, no potential fixes :(





VS2022: A million of macro hints...

```
AFTERWARP_API void SceneMeshMaterialGetShading(struct
```

```
    |> #define AFTERWARP_API __declspec(dllexport)
```

```
{ Expands to: __declspec(dllexport)
```

Copy | Expand Inline | Visualize Expansion | Search Online

Browsing operations around this macro may fail. Consider adding it to a hint file.




```
} Show potential fixes (Alt+Enter or Ctrl+.)
```


hM




Microsoft Wiki

→ No, I really wanted to see that ad!

 MICROSOFT WIKI  



 Sorry, the video player failed to load.
(Error Code: 100013)

in Microsoft choosing to not re-use version 4 to describe features intended for version 5.

2. The version number as reported by Microsoft's DxDiag tool (version 4.09.0000.0900 and higher) use the

SNCF Connect: From Paris to Milan

My train ticket...

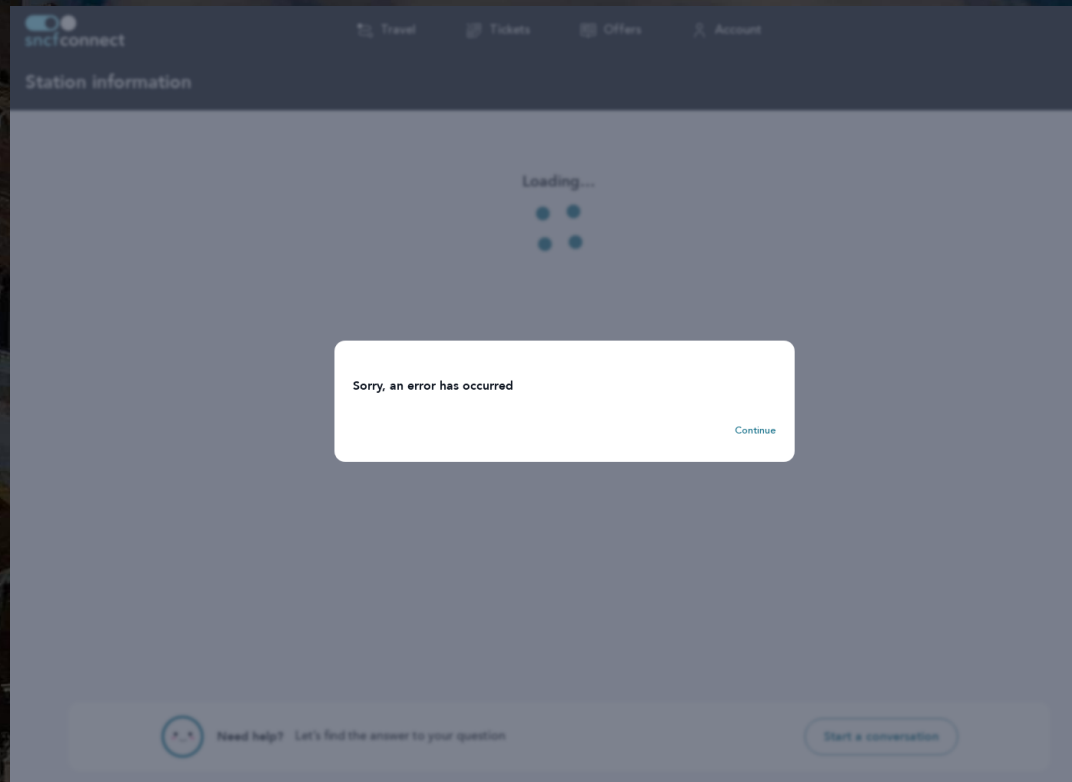
My train ticket...

My train ticket...

My train ticket...

My train ticket...

My train ticket...



Yahoo Weather vs Climate Change

Unusual heat wave, getting up to 40C...

16:03



↗ Cuernavaca
17:03 CDT



Bad air quality tap to view

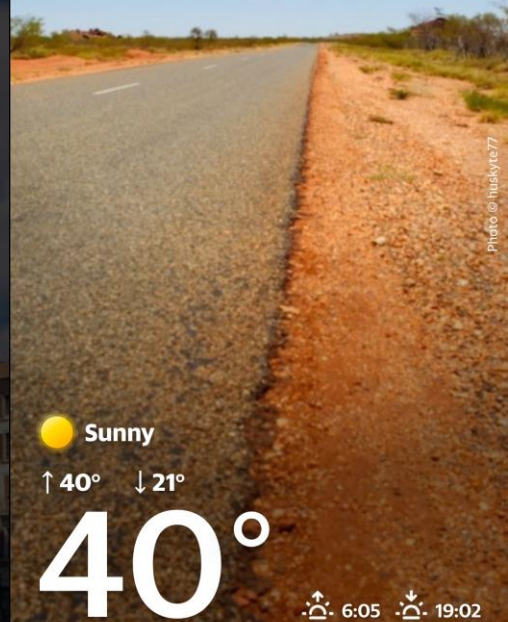


Photo © iuskyte77



Sunny

↑ 40°

↓ 21°

40°



6:05



19:02



Confirmed
by
local news
agency



Yahoo Weather Alert

3-6° degrees cooler than today.
This alert occurs every day.
We should be at -20° right now...



Temperature Change Alert

now

34° high tomorrow in Cuernavaca. 3° cooler than today.

TELCEL



Sun 19 ○ Waxing Gibbous

19:13



Temperature Change Alert

now

34° high tomorrow in Cuernavaca. 3° cooler than today.



TELCEL



Thu 23 ○ Full Moon

19:16



Temperature Change Alert

3m ago

33° high tomorrow in Cuernavaca. 6° cooler than today.



TELCEL



Fri 24 ○ Waning Gibbous

19:13



Temperature Change Alert

now

33° high tomorrow in Cuernavaca. 5° cooler than today.

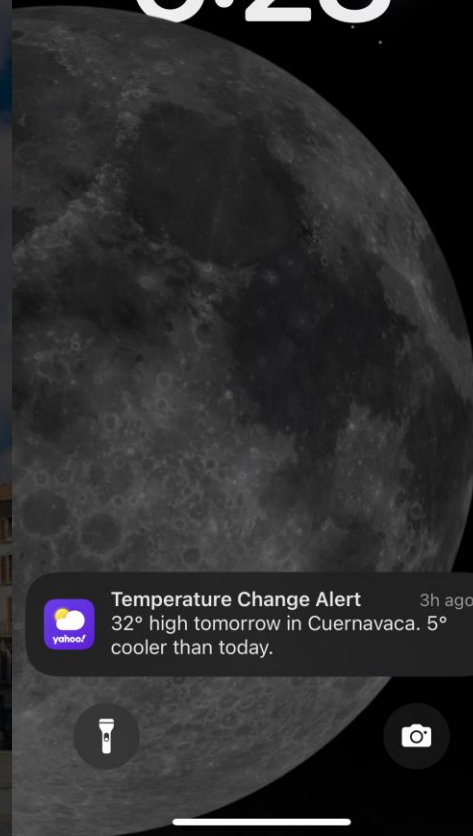


dafone IT



Sat 8 ● Waxing Crescent

6:28



Temperature Change Alert

3h ago

32° high tomorrow in Cuernavaca. 5° cooler than today.



One day Yahoo Weather will get it right...

But not today...





These bugs were found
just in a couple of days



Low expectations in absence of design

- Big marketing campaigns minimize apparent lack of design
 - Poor design choices are presented as improvements
- Users are “trained” to work through bugs and bad design choices
- Lack of communication between customers and developers
- Gradual decrease in quality throughout the years is less perceived compared to a sudden change
- Lack of interest in best practices in favor of quick’n’dirty solutions
- Job posting: software analyst, software architect...



Functional Requirements

- Define what the software should do
 - Have clear purpose and objectives
 - Avoid “feature creep”
 - “Worse is better” (less functionality in favor of better quality)
- Constrained scope and well-defined mission
- Have a formal “software specification” document
- Avoid common misconceptions and anti-patterns



Functional requirements: common mistakes

- Ambiguous requirements: multiple interpretations
- Over-specified: dictate “how” instead of “what”
- Under-specified: lack details
- Misconceptions and/or wrong assumptions
- Scope creep: uncontrolled increase in requirements
- Non-functional disguised as functional
- Leaky implementation details, ultra-premature optimizations



Non-Functional Quality Attributes

- Define software architectural and operating parameters
 - Can be thought of “how” instead of “what”
 - Reliability, performance, portability, maintainability, security, compliance, efficiency, fault tolerance, etc.
- Part of software design and architecture
 - Ideally, should be part of “specification document”
- Directly influence the quality of the software
- Require proactive continuous refactoring



Common Pitfalls in Software Development

- Massive over-engineering
 - A complex solution is pursued instead of what could have been a simple solution
- Growing technical dept
 - Quick'n'dirty solution requires massive rework or even a full rewrite afterwards
- Escalation of commitment
 - Poor outcome of a bad decision is ignored while wrong direction is pursued
- Sunken costs
 - New decision is made based on previous costs that already incurred



Common Pitfalls in Software Development

- Gold plating
 - Spending effort on task beyond its scope despite diminishing returns
- Design by a committee
 - A bulk of design decisions without no unifying plan or vision
- Cover your assets
 - Too much paperwork without much progress
- Premature optimizations
 - Trying to optimize too early which impacts negatively design



Common Pitfalls in Software Development

- Optimistic bias
 - Consequences of bad decisions are ignored in belief of an alternative outcome
- Wishful thinking
 - An unrealistic positive consequence is assumed to be feasible
- Developer burnout
 - Increasingly decreased productivity due to physical and emotional depletion
- Death march
 - A certain direction is pursued despite the evidence of an imminent failure

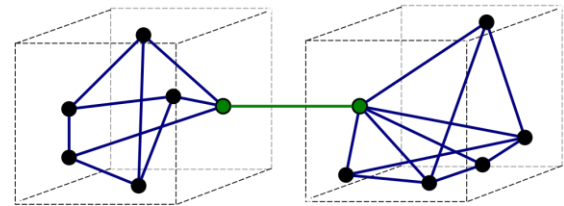


Embracing Best Practices

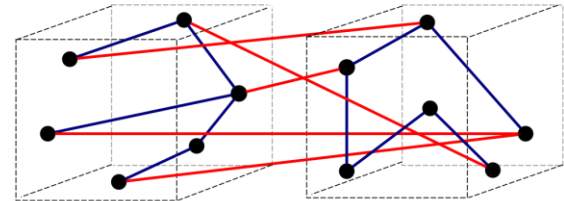
→ Coupling and Cohesion metrics

- Coupling is a degree of interdependence between the modules
- Cohesion is a degree to which elements inside module belong together

Continuous proactive refactoring is needed to keep these metrics at bay



a) Good (loose coupling, high cohesion)



b) Bad (high coupling, low cohesion)



Embracing Best Practices

- You are not going to need it (YAGNI)
 - “Always implement things when you actually need them, never when you just foresee that you need them”
- “Keep it simple, stupid!” or “KISS principle”
 - Design should be kept simple while unnecessary complexity be avoided



Embracing Best Practices

Write your specification document!



Discussion