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code vs. document inspection / review

last time requirements / design doc  
now code

→ show <sup>generic</sup> checklist from syllabus

go over team assignment

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in addition to unit testing  
& code inspection, need system  
testing

metamorphic testing is one approach  
to system (or unit) testing

but not standard approach  
- normally do same kind  
of black box testing  
as for units

- equivalence classes  
& boundaries

the book discusses how system  
testing fits with iterations

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one approach

→ it1 → it2 → it3 → test → release  
tho a very late in process

or do

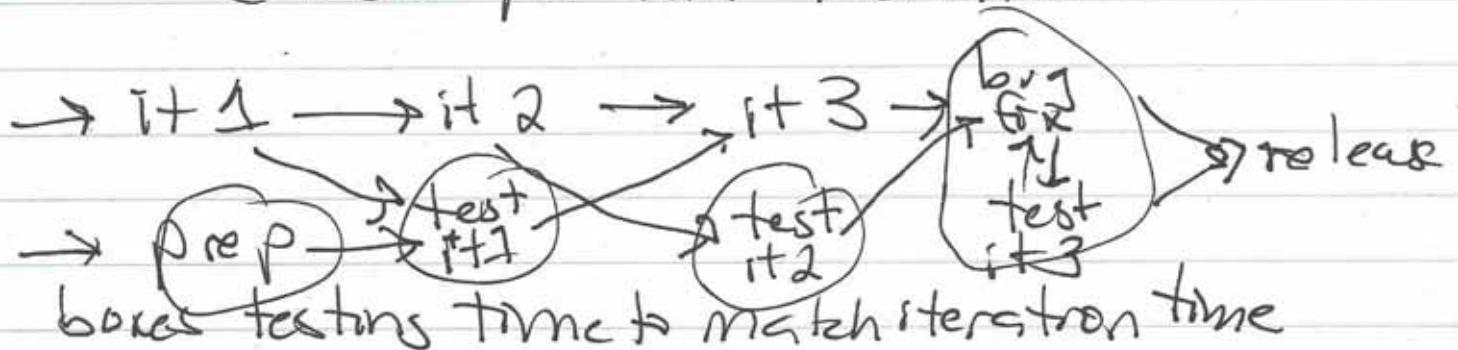
→ it1 → test → it2 → test  
→ it3 → test → release

~ doubles length of time  
until release

both approaches developers can do  
system testing themselves or  
use separate testing team

best to have separate team  
why??

if separate team available, then  
can do parallel iterations





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## life of a bug

- tester finds a bug
- tester files bug report

version,  
platform,  
etc.

need a lot of detail  
what were you trying to do  
Steps to re-create it you can  
any error messages  
what you did immediately before  
what you had expected to happen

- Create a task to fix the bug  
prioritized by customer  
↑

Severity  
vs.  
priority

- ~~note~~ this makes sense  
for system tests but not  
unit tests  
why?

- fix bug  
write test case that exposes bug  
test should initially fail  
after ~~test~~ bug fixed &  
test passes  
need tester to re-test ~~bug report~~ before closing

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- ~~check~~ tester checks the fix & verifies it works  
~~then marks as closed~~
- update bug report  
mark as closed

Need to use bug tracker tool  
we'll just use JIRA but  
there are many other tools

record & communicate priorities  
record all discussion, test cases,  
code changes, verifications &  
decisions about each bug  
generate metrics

what is new bug submission rate?  
going up or down?

do many bugs come from  
same area of code?

how many bugs left to be fixed?  
"zero-bug-bounce"

before production release

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in between unit testing & system testing ~~it~~ is another granularity of testing not discussed in book

→ what is it?

integration testing

big bang - system test w/o integration test

top-down

in control flow hierarchy

bottom-up

sandwich

replace stubs vs.  
replace drivers

all build on drivers & stubs (test harness) from unit testing

→ pick two components that have already been tested

- might be individual units  
- integration test full class calling its own methods before integrating with other classes



- Or integrate ~~two~~ one unit  
into already integrated  
set of units.

- the goal is to test ~~\*interfaces\*~~

so need units that involve the  
interfaces of other units

previously replaced with stubs  
in unit testing  
& called by drivers

special testing code  
so can test unit in isolation

need to consider all the ways  
that one unit can invoke  
(or pass data to) another

consider output as well  
as inputs

previously considered equivalence  
classes only for inputs  
→ now consider output too

or make stubs to  
take errors &  
exceptions

to force all  
errors & exceptions  
as well as valid