

Lecture Week 1

Semester 2 2023



SOFTWARE SYSTEMS ARCHITECTURE UG/G (11491/8746)

Introduction

Richa Awasthy

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ACKNOWLEDGEMENT OF COUNTRY

The University of Canberra acknowledges the Ngunnawal people as the traditional custodians of the land upon which the University's main campus sits, and pays respect to all Elders past, present and emerging.

WEEK 1: AGENDA

1. Introduction to the Unit
2. Student support information
3. A System
4. Agile Project Management - Part I

ANNOUNCEMENTS/REMINDERS

- Quiz1 opens tonight, 1st Aug at 18:00
- **There are no extensions for quizzes.**
- **Tutorial Classes:**
 - As per the university guidelines we have returned to on-campus mode. However, we have a tutorial and lab in online mode as well.
 - Students should attend the tutorial classes in-person or virtually via the virtual room on Canvas site for the unit.
 - There are legal limits for the number of students a tutorial class may have. If this limit is reached, no more students can take that class.
 - If you still haven't enrolled into a tutorial class, do it ASAP!

If you have any problems related to tutorial allocation, send an email to Richa.awasthy@canberra.edu.au so we can sort out your situation.

1. INTRODUCTION TO THE UNIT

UNIT OUTLINE

UNIT OUTLINE

- Unit outline is available from the unit homepage on Canvas

[Unit Outline: Software Systems Architecture \(11491\), Semester 2 2023, BRUCE \[ON-CAMPUS\]](#)

[Unit Outline: Software Systems Architecture G \(8746\), Semester 2 2023, BRUCE \[ON-CAMPUS\]](#)

Core Unit Details:

Unit code and version	Unit offering option	Study level	Credit points
11491.1	213698	Level 3 - Undergraduate Advanced Unit	3

Faculty	Discipline	Unit offering details
Faculty of Science and Technology	Academic Program Area - Technology	Semester 2, 2023 , ON-CAMPUS , UC - Canberra, Bruce

Unit convener name and contact details	Administrative contact details
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Unit Convener/Lecturer	Student Central
<i>Name: Dr. Richa Awasthy</i>	Building 1, Level B
<i>Availability: By appointment</i>	E: Student.Centre@canberra.edu.au
<i>Office:6C30</i>	T: 1300 301 727
<i>Email:richa.awasthy@canberra.edu.au</i>	

Core Unit Details:

Unit Convener Name and Contact Details:

Unit Convener:

Richa Awasthy

Email: Richa.Awasthy@canberra.edu.au

• CONSULTATION HOURS

- With appointment.
- Please send an email to richa.awasthy@Canberra.edu.au with an agenda before meeting during the contact hours;
- In other cases send an email and expect a response in 2-3 working days.
- If you show up unannounced, I may not be able to talk to you.

UNIT DESCRIPTION

- In this unit, the students will learn how to produce software architecture design from system requirements;
- The course covers terms, concepts and techniques used in the design of software architectures, including architectural requirements, architectural styles, architecture documentation and architecture evaluation.
- Students will learn about the role of architecture and architects in software engineering.
- Modern architectures such as service-oriented and cloud architecture are also covered in detail.

LEARNING OUTCOMES

On successful completion of this unit, students will be able to:

1. Demonstrate a firm understanding of the principles of software architecture, architectural best-practices, and how architecture is used in modern software engineering;
2. Understand the role of a software architect in software engineering practice;
3. Examine and compare various architecture styles and solutions;
4. Design an architecture that reflects and balances the different needs of its stakeholders; and
5. Communicate the architecture to stakeholders and demonstrate that it has met their requirements.

TIMETABLE OF ACTIVITIES

Week	Topic	Assessment Due
1	Introduction to the unit	NO TUTORIAL
2	Software systems architecture	Tutorial 1 and Online Quiz 1
3	Quality attributes	Tutorial 2 and Online Quiz 2
4	Quality attributes	Tutorial 3 and Online Quiz 3
5	Quality attributes	Tutorial 4 and Online Quiz 4
6	Architectural tactics & patterns	Mid-term Assessment
7	Architectural tactics & patterns	Tutorial 5 and Online Quiz 5
8	CLASS FREE PERIOD	
9	Architectural tactics & patterns	Tutorial 6 and Online Quiz 6
10	Architectural tactics & patterns	Tutorial 7 and Online Quiz 7
11	Architectures in the cloud	Tutorial 8 and Online Quiz 8
12	Architectures in the cloud	Tutorial 9 and Online Quiz 9
13	Review	Tutorial 10 and Online Quiz 10
14	Final assessment	
15	EXAM PERIOD	

Note: Changes in the timetable may occur. Please check constantly announcements on Canvas and your UC email for updates.

UNIT RESOURCES

Required texts

Recommended Textbook:

Len Bass, Paul Clements and Rick Kazman. (2013) *Software Architecture in Practice*, Addison-Wesley, 3rd edition.

Supplementary Textbooks:

Richard N. Taylor, Nenad Medvidovic and Eric Dashofy. (2009) *Software Architecture: Foundations, Theory, and Practice*, Wiley.

Roger Pressman and Bruce Maxim. (2014) *Software Engineering: A Practitioner's Approach*, McGraw-Hill Education, 8th edition.

John Dooler. (2011) *Software Development and Professional Practice*.

Additional references:

- On the slides as required
- Acknowledgement in the presentation

Assessment item details:

- **Continuous assessment:**
 - Weekly quizzes – 20%
 - Tutorial activity (Group assignment) – 10%
- **Mid-term assessment:** On-campus during a one-off lab in Week 6 - 20%
- **Final assessment:** Group assignment - Due Tuesday Week 13 – 50%

Overall mark:

Overall Mark = Mid-Term Assessment (20%) + Tutorial (10%)
Quizzes (Continuous Assessment) (20%) + Final assessment (50%)

Conditions to **pass** the unit:

1. Students need to obtain at least 50% in the Overall Mark, calculated as described above;
- and**
2. Students need to obtain at least 40% in the Final assessment.

Final grade

Once you have met the conditions for a **Pass**, higher grades will be awarded on the basis of the highest category shown below, in which your marks fit.

$85 \leq \text{Final mark} \leq 100$

Final grade = HD

$75 \leq \text{Final mark} < 85$

Final grade = DI

$65 \leq \text{Final mark} < 75$

Final grade = CR

$50 \leq \text{Final mark} < 65$

Final grade = P

$0 \leq \text{Final mark} < 50$

Final grade = FAIL (NX, NS, NC or NN)

The unit convener reserves the right to question students orally on any of their submitted work.

Student feedback:

- The content and material prepared for this unit have been reviewed in the light of feedback from previous student surveys/evaluation:
 - As InterFace surveys will run through the semester, adjustments may be made to this unit based on feedback.
- Student feedback is always welcome and much appreciated!
- Students will be encouraged to answer to all InterFace's feedback surveys;
- In addition, please feel free to contact the Lecturer at richa.awasthy@Canberra.edu.au or to talk to anyone in the teaching team.
- The ultimate goal is to provide the students the best possible experience and a great learning opportunity!



UNIVERSITY OF
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Student Experience Survey

What is SES?

The SES is a comprehensive study of current higher education students in Australia. If you're an **undergraduate or postgraduate coursework student in the first or final year of your course**, you may be eligible to take part.

The SES is **your chance to have your say about what it's like being a higher education student in Australia today**. By sharing your experiences, you can assist institutions and the government to **improve course offerings, student services and campus facilities**.

You could win a prize by completing the SES. The earlier you complete the survey, the more chances you have to win.



qilt.edu.au/ses

Terms and conditions apply



Welcome to the University of
Canberra



UNIVERSITY OF
CANBERRA



STUDENT SUPPORT INFORMATION

DISTINCTIVE BY DESIGN

SCIENCE AND TECHNOLOGY

canberra.edu.au/scitech

STUDENT CENTRAL

- Located in Building 1
- This is the 'first stop' for any administrative enquiry
- Student Centre staff will provide assistance, or refer you to Faculty staff, Student Wellbeing team or Inclusion UC Team

student.centre@canberra.edu.au

1300 301 727

DROP-IN COURSE ADVICE

- Drop-in course advice is available for the Faculty of Science & Technology
- Check times at: [Course advice \(canberra.edu.au\)](https://www.canberra.edu.au/course-advice)

OSHC - ALLIANZ

- The Allianz team are available to assist international students with enquiries about their health cover.

CAN HELP WITH:

Passwords; setting up your student email account
Self Enrolment
HECS-HELP, FEE-HELP and SA-HELP
MyUC – Student Portal
Tutorials and Timetable
ID Cards
Student Services and Amenities Fee (SSAF)

Consent Matters

We all have the right to a respectful and supportive environment where we can study, work and live safely.

Consent matters is an online course to educate on the culture of respectful relationships and being an active part of a respectful community.

[canberra.edu.au/safe-community](https://www.canberra.edu.au/safe-community)

COURSE ADVICE

Can include:

- Study plan advice
- Applications for credit (advanced standing)
- Variations to enrolment
- Variations to course requirements
- Issues with course progress
- Applications for cross-institutional study, study abroad and exchange programs

[Course advice \(canberra.edu.au\)](https://canberra.edu.au)

Student Centre Drop-In hours and days

Orientation Week

Thursday only

10am - 12pm

Week 1 onwards

Wednesday and Thursday

10am - 12pm

Other dates

Friday (Week 4) 10am - 12:30pm and 1:30pm - 4:00pm

Email the Faculty Education Team

If you need course advice outside of the Faculty's drop-in hours, please email

SciTech-StudentEnquiries@canberra.edu.au

The Faculty Education Team will be able to assist you with your queries in the first instance, and will escalate your query on to the Program Directors if required.

Study Skills

On-campus and online study help

- Time management
- Using online learning sites e.g. MyUC, UCLearn
 - Assessment writing
 - Researching & note-taking
 - English language skills
 - Academic integrity
 - Referencing and more

Timetables and access information on the

Study Help site:

www.canberra.edu.au/studyhelp

E: studyskills@canberra.edu.au

Study Skills Services

ASK Advisors – general study and Library help

Study Skills Drop-in – specialist study, referencing and language help

PALS (Peer Assisted Learning Sessions) – group study sessions for many core units in SciTech, BGL and Health

MASH – specialist Maths, Statistics and IT Help



Studiosity

Online 24/7 study help:

Writing Feedback

Connect Live

Available via the left menu of your unit teaching sites or the Study Help site

Study Skills Courses

Self-paced:

Academic Integrity Module (AIM)
Study Skills for Success

Workshops:

English for Uni
Study Skills for Success

The Study Help site has over 200 self-paced online resources. It is available 24/7 via the Student Support Hub.

SPECIALISED SERVICES

UC Wellbeing

- Student Wellbeing provides individualised support and information to help you navigate your journey at UC in the best way possible.
- We are an experienced team of wellbeing professionals, passionate about ensuring that all students are supported in a meaningful way. We acknowledge that there are many factors that may impact you throughout your studies, and these can be one-off, ongoing or impact you suddenly.

How to connect with us

You can connect with the Student Wellbeing team on campus, online and via phone.

Book here [UC Student Wellbeing \(office365.com\)](https://office365.com)

Bruce Campus

Our team is available for drop-in support between 10am-4pm.

Students can also book an appointment to meet with a Wellbeing Advisor for an individualised support session.

Book here [UC Student Wellbeing \(office365.com\)](https://office365.com)

SPECIALISED SERVICES

INCLUSION UC

- Located in Building 1
- This team provide support for students with a disability or ongoing health condition (including mental health conditions)
- inclusion@canberra.edu.au
- 02 6201 5233

[Further information about Inclusion UC](#)

MEDICAL AND COUNSELLING

- Located in Building 1
- Provides a comprehensive range of general practitioner, nursing and counselling services
- Medicare covers all UC Medical Centre Doctors general consultations, for domestic students. All general Doctors consultations for international students are covered by their OSHC insurance
- The Centre offers free and confidential counselling to all UC students.
- 6201 2351
- [Medical & Counselling Website](#)

SPECIALISED SERVICES

CAREERS UC

- UC boasts one of the largest work integrated learning (WIL) programs in Australia. Students work while they learn in every degree and participate in a wide range of work placements, internships and industry projects.
- Located in Building 1, Level C, above the Refectory.
- Advice on Placement requirements, Internships, finding employment and career guidance.
- careers@canberra.edu.au
- [Careers UC Website](#)

NGUNNAWAL CENTRE

- Located in Building 9, A02.
- If you identify as an Aboriginal or Torres Strait Islander the Ngunnawal Centre can assist you by providing a range of academic programs and pastoral support services.
- ngunnawaladmin@canberra.edu.au
- [Ngunnawal Centre Website](#)

SPECIALISED SERVICES

INTERNATIONAL STUDENT SUPPORT SERVICES

- Located in Student Central
- The International Student Support Service (ISSS) is a dedicated service for international students matters including advice on CoE, enrolment variation, Student Visa Conditions and programs to improve study experiences, health and wellbeing.
- international.student@canberra.edu.au
- [Life as an international student \(canberra.edu.au\)](https://canberra.edu.au/life-as-an-international-student)

UCX FOOD PANTRY

- Located in the UCX Student Lounge, Building 1 Level A.
- The pantry provides students access to free food items each week. It mostly stocks non-perishable essential food items however also receives fruit and vegetables from OZ Harvest and facilitates Student Fresh box deliveries.
- [UCX Student Lounge \(canberra.edu.au\)](https://canberra.edu.au/ucx-student-lounge)

EMERGENCY CONTACT INFORMATION

University of Canberra Crisis Line (after hours)

Phone: 1300 271 790

Text: 0488 884 227

Poisons Information Centre

Phone: 131 126

[CALMS - Canberra After-hours Locum Medical Service](#)

Phone: 1300 422 567

[Lifeline \(Counselling service\)](#)

Phone: 13 11 14

[After-hours GP Helpline - \(Healthdirect Australia\)](#)

Phone: 1800 022 222

[Access Mental Health](#)

Phone: 1800 629 354

EMERGENCY CONTACT INFORMATION

[Campus security](#)

Phone: 6201 2222

[Rape Crisis](#) (Phone support between 7am and 11pm)

Phone: 6247 2525

Text: 0488 586 518

[Domestic Violence Crisis Service](#)

Phone: 6280 0900

Text: 0421 268 492

[SAMSSA](#) (Support for men that have experienced sexual assault or past abuse) Phone: 6247 2525

For more emergency contacts, visit [Your wellbeing \(canberra.edu.au\)](#)

UC STUDENT MENTOR PROGRAM

“As a new student on campus, this program helped me feel like I had someone that could help me out when I needed it. I felt really supported and had a really great time meeting up with my mentor.”

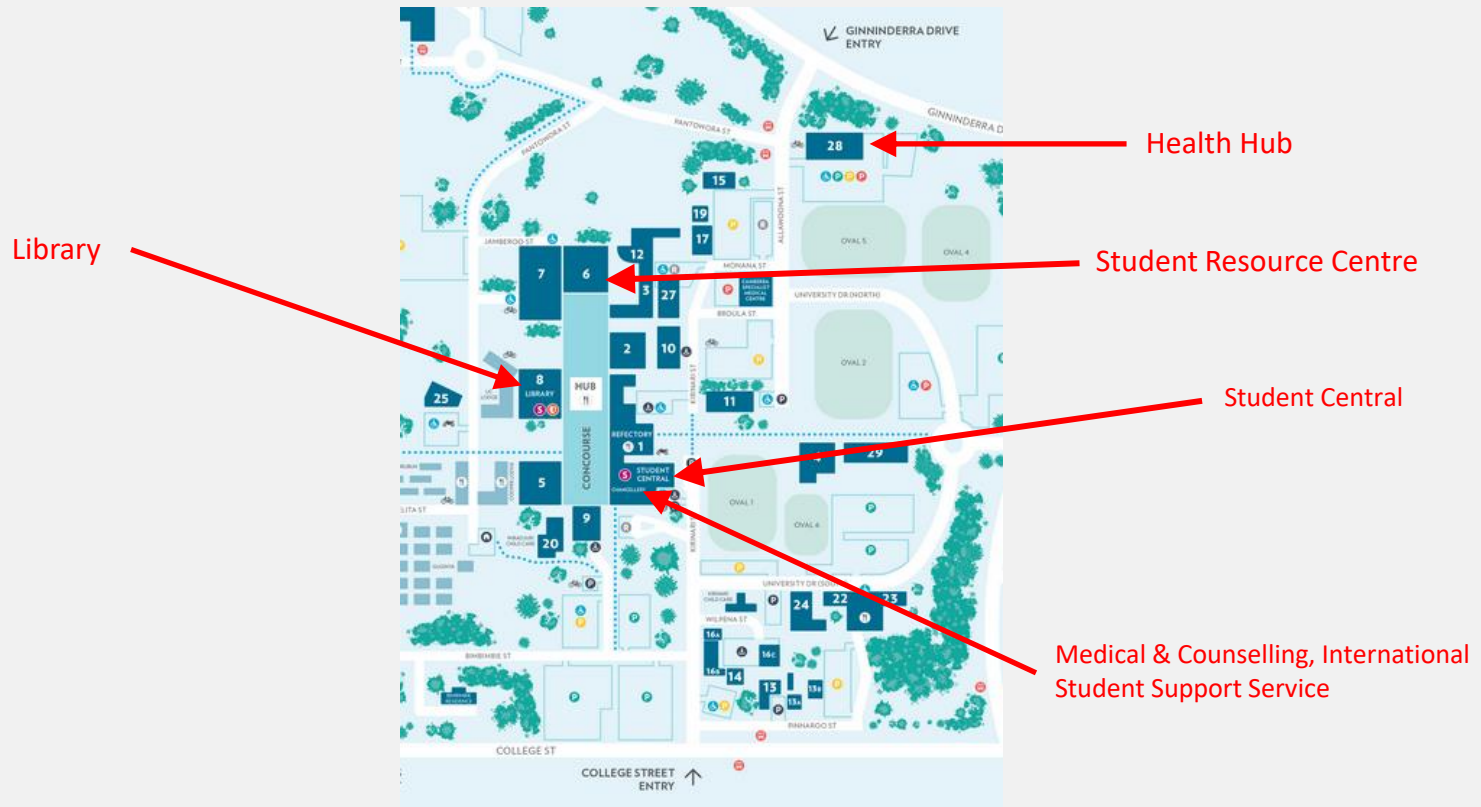
- previous UC STUDENT



If you're a new student to UC, you are not alone. You have guaranteed support from your first day onwards. The UC Student Mentor program is students supporting students. Just register, get matched up with your mentor and connect – it's that simple.

Sign up for a Student Mentor. For more information, contact UCthrive@canberra.edu.au

BRUCE CAMPUS



Software Systems Architecture

Career possibilities

Top Jobs:



Source: CareerCast [<http://www.careercast.com/jobs-rated/2017-jobs-rated-report>]; Salaries in American Dollars

AND HOW ABOUT THE FUTURE?

- TED Talk
 - Andrew McAfee:
“Are droids taking our jobs?”
 - https://www.ted.com/talks/andrew_mcafee_are_droids_taking_our_jobs
- [Why AI will never replace humans | Alexandr Wang | TEDxBerkeley - YouTube](#)

Semester goals?

<https://www.mentimeter.com/app/presentation/altq98tevg5c62fd33z6yy43wtkfsy5c>

Learn how to build Software Systems Architectures to create quality software systems, applications and solutions.

Become a better, reliable and valuable ICT professional.

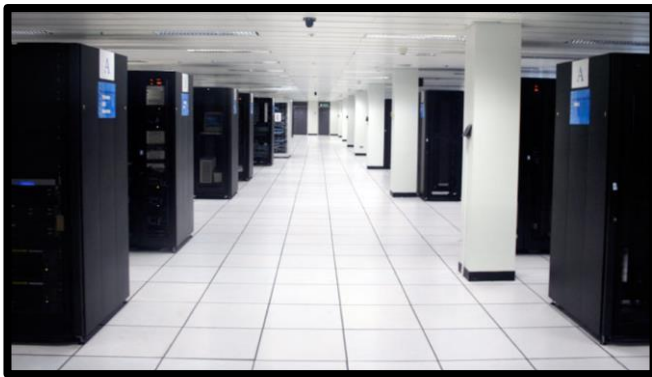
A System

In simple terms, 'a system can be defined as a group of interacting, interrelated, or interdependent parts that form a unified whole having a specific purpose' [Kim, 1999].

What's Software Systems Architectures got to do with IT?

- Every system has an architecture!
 - It may not be a formal architecture, but one still exists.
- Software systems architecture:
 - Process of defining a structured solution to meet all of the technical and operational requirements...
 - ... while optimizing common quality attributes such as performance, security, and manageability.
- It involves decisions on a wide range of factors
 - – Each of them can have considerable impact on the system quality and overall success of the application!

- Distributed Resource Management System
- Purpose of a DRMS:
 - Manage computational resources on supercomputers & cloud environments

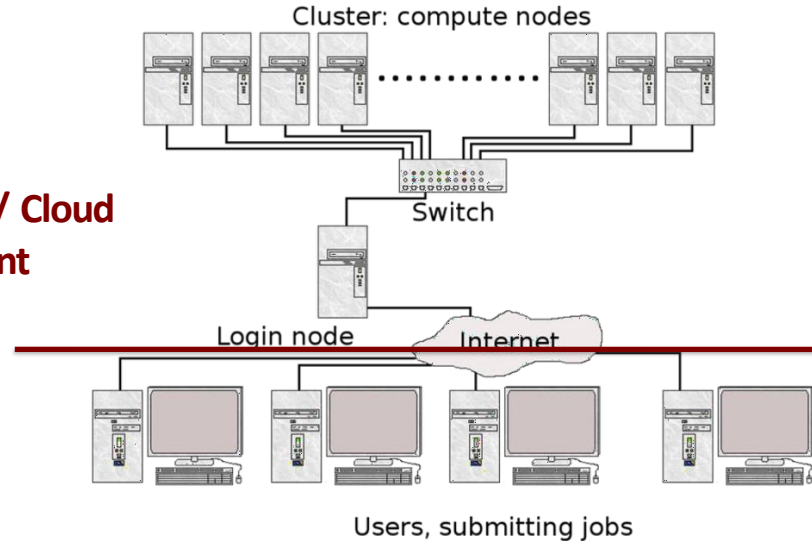


- Examples of real DRMS:
 - SLURM: <http://slurm.schedmd.com/>
 - PBS Professional: <http://www.pbsworks.com/>
 - MOAB HPC SUITE: <http://www.adaptivecomputing.com/>

How DRMS works

- DRMS
 - Will allocate computer nodes for the user

Supercomputer / Cloud Environment



- Process:
 - User requests resources (e.g., 10 nodes from the cloud to run a system)
 - DRMS will verify: a) if user is allowed to use resources in this environment; b) if requested resources are within the user's quota; and c) if resources are available
 - If the three conditions are "TRUE", DRMS will allocate the resources and the user will be able to run their jobs

Tutorial activity

- Agile project management: creating and maintaining a Scrum board
- Agile system requirements identification: user stories
- QAS (Quality Attribute Scenarios) for the most important quality attributes in the DRMS, such as:
 - Security
 - Availability
 - Modifiability
 - Usability
 - Interoperability
 - Performance
 - Testability
- Build Utility Tree for the DRMS
- Software Systems Architecture for the DRMS

Agile Project Management

- Agile processes were a response to a need for projects to
 - Be more responsive to their stakeholders
 - Be quicker to develop functionality that users care about
 - Show more and earlier progress in a project's lifecycle
 - Be less burdened by documenting aspects of a project that would inevitably change

Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions	over	processes and tools
Working software	over	comprehensive documentation
Customer collaboration	over	contract negotiation
Responding to change	over	following a plan

That is, while there is value in the items on the right, we value the items on the left more. [agilemanifesto.org]

During an agile project, planning occurs at three levels:

- ✓ **Release planning:** Release plans contain a release schedule for a specific set of features. The product owner creates a release plan at the start of each release.
- ✓ **Iteration planning:** Team members gather at the beginning of the iteration (referred to as a *sprint* in the Scrum methodology) to identify the work to be done during that iteration. This is referred to as *self-organization*.
- ✓ **Daily planning:** Development teams begin each day with standup meetings to plan the day. These meetings are generally 5 to 15 minutes long.

Daily Coordination Meeting

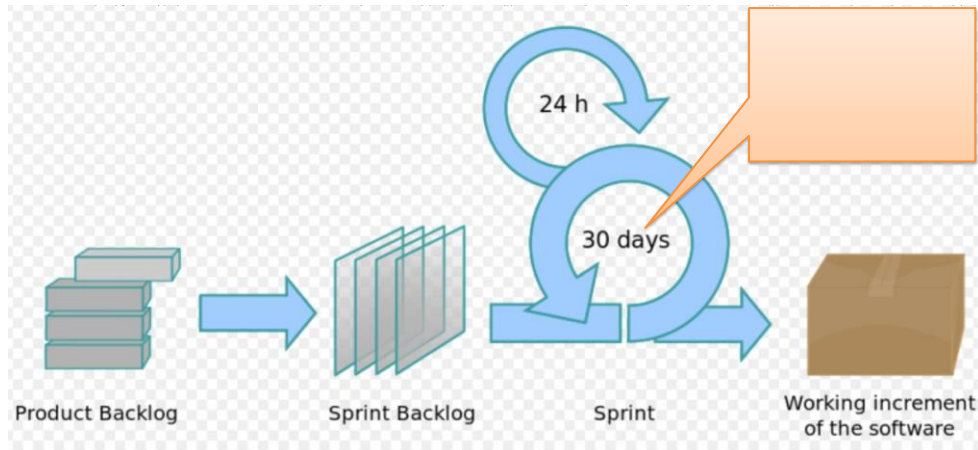
On agile projects, you make plans throughout the entire project daily. Agile development teams start each workday with a 15-minute (or less) daily coordination meeting to note completed items, to identify impediments, or roadblocks, requiring team lead involvement, and to plan their day.

In the daily coordination meeting, often called a daily standup meeting, each development team member makes the following three statements:

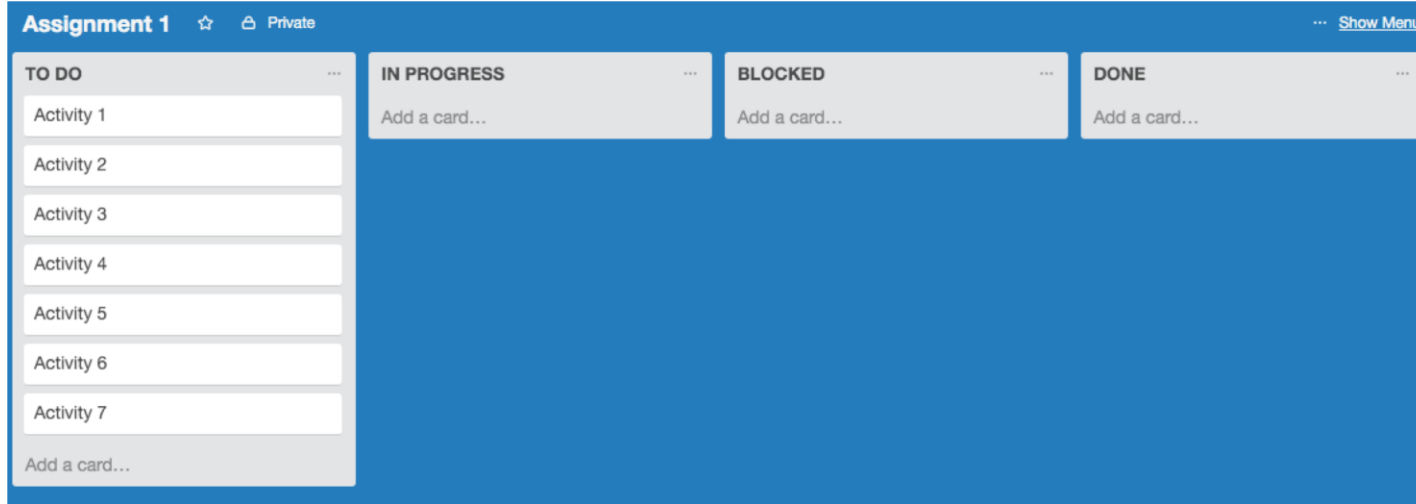
- ✓ Yesterday, I completed *[state items completed]*.
- ✓ Today, I'm going to take on *[state task]*.
- ✓ My impediments are *[state impediments, if any]*.

- Scrum is the most popular approach to agile software development
 - With this approach, any adjustments the development team makes to any aspect of the project is based on experience, not theory

The Scrum Process



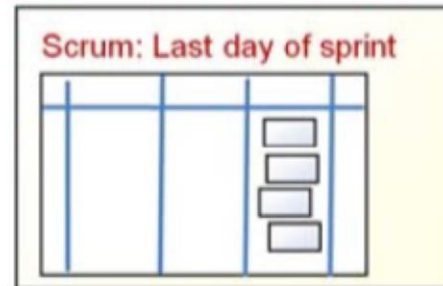
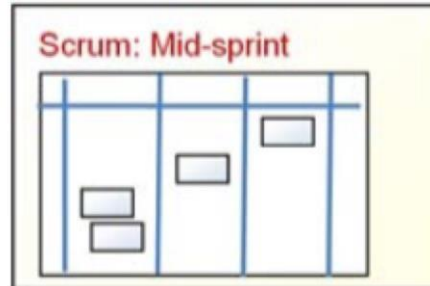
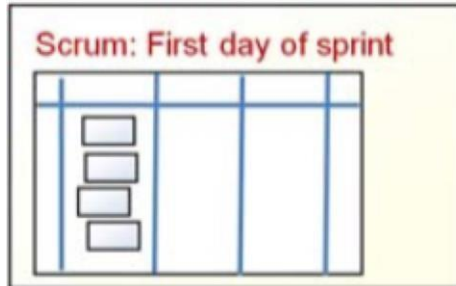
Scrum Board- Sprint



Scrum Board- Sprint

Assignment 1 ☆ Private ... Show Menu

TO DO	IN PROGRESS	BLOCKED	DONE
Activity 1	Add a card...	Add a card...	Add a card...
Activity 2			
Activity 3			
Activity 4			
Activity 5			
Activity 6			
Activity 7			
Add a card...			



SCRUM BOARD-TRELLO.COM



Trello lets you work more collaboratively and get more done.

Trello's boards, lists, and cards enable you to organize and prioritize your projects in a fun, flexible and rewarding way.

Sign Up – It's Free.

[Log in...](#)

REFERENCES:

- Len, Bass, Clements Paul, and Kazman Rick. (2013) "Software architecture in practice." Boston, Massachusetts Addison. 3rd Edition.
- Ambler and Holitza (IBM). Agile for Dummies (2012, John Wiley & Sons Inc. Available online at: https://www-01.ibm.com/marketing/iwm/iwm/web/signup.do?source=swg-rtl-sd-wp&S_PKG=500026415&S_TACT=102G546W
- Kniberg and Skarin. Kanban and Scrum: making the most of both. Available online at: <http://www.infoq.com/minibooks/kanban-scrum-minibook>
- [https://en.wikipedia.org/wiki/Scrum_\(software_development\)](https://en.wikipedia.org/wiki/Scrum_(software_development))
- <https://help.rallydev.com/writing-great-user-story>
- Microsoft Application Architecture Guide, 2nd Edition. Available online at <https://msdn.microsoft.com/en-us/library/ff650706.aspx>.

