CS7NS1 2023-24

Project 3

For project three I want you to conceive, design, implement, build and prove a secure, sufficient peer-to-peer networking protocol, with mandatory Information Centric Networking principles and implementation at its core e.g. Named Data Networking.

The emulated use case for demonstration and testing purposes can be any sufficiently realistic, (highly) disconnected, scalable use case of your choosing e.g. vehicular mobility contexts, Mars Rovers, underwater search and rescue missions, etc.

For your chosen scenario(s), you must create multiple such information centric 'networks' (multiple) for communication to happen between. Please implement no less than 5 separate and distinct device instances on each 'network'. Each device instance must have available no less than 8 distinct local sensors/actuators that are demonstrably securely interacted with. Each network and device should be configured to credibly emulate scalable entities and network functionalities and communication appropriate to the chosen setting/use case.

A key intent of this project is to cause you to clearly focus on the different ways in which naming, discovery, routing etc can securely occur when unshackled from traditional IP paradigms and behaviour's in scalable systems in challenging contexts.

This is a **WHOLE group FULLY ACTIVE participation** project. If either a majority of your group, or the lecturer, view you as having failed to fully contribute your score for Project 3 will be reduced. Groups are included below.

Deadlines are as per blackboard and the online demo interview calendar.

Requirements, Constraints and Suggestions:

i) You may not assume communication with infrastructure gateway nodes or infrastructure participants, *-except-* where your system securely engages with such a node as an integral part of your ICN solution as part of its regular operations. In such a case, ICN process and communications, and their purpose, should be clearly evident throughout. The clear separation, and handling, of any control and data messaging in an ICN context should be evident.

ii) You must implement and demonstrate your system on your groups RPi(s), to the greatest extent practicable. Practical demonstration will form part of the live interview before the end of semester. Where you implement functionalities off-Pi, you should provide a clear, cogent and convincing articulation for said decisions – and the realism of same.

iii) You should implement no less than the prescribed number and types of devices and entities per device. You are free to implement as many more as you see fit.

iv) Your approach and solution should be both carefully considered and maximally scalable and secure in design and implementation. It must be sufficiently robust to the failure of one or more nodes and/or networks. You will be required to demonstrate these capabilities, and the associated signaling and communication modalities. These will be key assessment aspects of your solution.

v) Your specific, assessable implementation should provide for, and clearly demonstrate, simulated mobility and unreliability appropriate to your chosen use case. You may use any appropriate ICN mobility, discovery, routing and/or other approach/model(s) as your group agree appropriate and secure for the task. These design and implementation

decisions should be both local and specific to your group. Please document your choices and rationales as part of the final design document that will be required as a submission from each group.

vi) I suggest that not only each group, but many groups, discuss and agree collaborative approaches to this task – particularly for effective and scalable ICN constructs. Device models and concepts for models can be openly discussed and shared on Piazza, subject to each group fully understanding all code and models they choose to use or rely on. You know I will also quiz you on this in interview.

Bonus:

1. Bonus marks will be available for demonstrating clear, convincing and scalable interoperability (during live interview) with independent implementations by other groups. (5)

2. Bonus marks will be available for implementing and demonstrating enhanced system capabilities through the appropriate and targeted use of AI/ML techniques to/for aspects of the security you incorporate in your solution. (10)

Assessment:

Assessment will be via three submissions and one live group interview. If you fail to contribute to any of these elements, your score will be reduced/zero on that element.

i) Project 3 final group report (group report – highlighting how you satisfied all requirements ; what you did, how you did it, why you did it that way, why it matters; – submit via Blackboard)

ii) Project 3 final codebase (please highlight using comments the main areas of contribution of each group member to the uploaded codebase) – submit via BlackBoard

iii) Peer and group evaluation and self-assessment --- link to follow

iv) Live group interview and demo 16-17 Nov – book your GROUP slot here (only 1 booking per group): --- https://outlook.office365.com/owa/calendar/Project3GroupDemos1@TCDUD.onmicrosoft.com/bookings/

v) Please also complete the module survey, which will be available from the Blackboard link on the last week of term. Completing the survey counts towards your participation mark.

Updates:

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Project 3

ID	Host	Groups
BRYANSI@TCD.IE	rasp-001.berry.scss.tcd.ie	1
GUPTAAY@TCD.IE	rasp-001.berry.scss.tcd.ie	1
ANANTONY@TCD.IE	rasp-006.berry.scss.tcd.ie	1
YTENG@TCD.IE	rasp-009.berry.scss.tcd.ie	1
SAISANKP@TCD.IE	rasp-002.berry.scss.tcd.ie	2
HAKHAN@TCD.IE	rasp-002.berry.scss.tcd.ie	2
BYADAV@TCD.IE	rasp-025.berry.scss.tcd.ie	2
DOWLINS6@TCD.IE	rasp-027.berry.scss.tcd.ie	2
OCALLAP2@TCD.IE	rasp-003.berry.scss.tcd.ie	3
YIJIANG@TCD.IE	rasp-003.berry.scss.tcd.ie	3
NAIKDHUS@TCD.IE	rasp-015.berry.scss.tcd.ie	3
YQIAO@TCD.IE	rasp-023.berry.scss.tcd.ie	3
MCMAHOE3@TCD.IE	rasp-004.berry.scss.tcd.ie	4
LINGASAB@TCD.IE	rasp-004.berry.scss.tcd.ie	4
STSAI@TCD.IE	rasp-046.berry.scss.tcd.ie	4
LUNAWATS@TCD.IE	rasp-046.berry.scss.tcd.ie	4
MAWHINNC@TCD.IE	rasp-007.berry.scss.tcd.ie	7
ZHAOR1@TCD.IE	rasp-007.berry.scss.tcd.ie	7
ZHANGY46@TCD.IE	rasp-045.berry.scss.tcd.ie	7
DASSM@TCD.IE	rasp-045.berry.scss.tcd.ie	7
SUNPE@TCD.IE	rasp-008.berry.scss.tcd.ie	8
CHENY28@TCD.IE	rasp-008.berry.scss.tcd.ie	8
SHAHSM@TCD.IE	rasp-044.berry.scss.tcd.ie	8
SSHAIK@TCD.IE	rasp-044.berry.scss.tcd.ie	8
BURTOND@TCD.IE	rasp-010.berry.scss.tcd.ie	10
AKGARG@TCD.IE	rasp-010.berry.scss.tcd.ie	10
DHINGRAS@TCD.IE	rasp-043.berry.scss.tcd.ie	10
YLIAO@TCD.IE	rasp-043.berry.scss.tcd.ie	10
RAJAKOTS@TCD.IE	rasp-005.berry.scss.tcd.ie	11
CORRALP@TCD.IE	rasp-011.berry.scss.tcd.ie	11
JADHAVD@TCD.IE	rasp-042.berry.scss.tcd.ie	11
DARDAT@TCD.IE	rasp-042.berry.scss.tcd.ie	11
ZHANGJ20@TCD.IE	rasp-012.berry.scss.tcd.ie	12
VANMARKJ@TCD.IE	rasp-012.berry.scss.tcd.ie	12
SHETTYP@TCD.IE	rasp-041.berry.scss.tcd.ie	12
PEDGAOKS@TCD.IE	rasp-041.berry.scss.tcd.ie	12
RAOSP@TCD.IE	rasp-013.berry.scss.tcd.ie	13
RODRGUER@TCD.IE	rasp-013.berry.scss.tcd.ie	13
DIFALLAM@TCD.IE	rasp-040.berry.scss.tcd.ie	13
WAZHANG@TCD.IE	rasp-040.berry.scss.tcd.ie	13
REGITZS@TCD.IE	rasp-014.berry.scss.tcd.ie	14
ALAMMU@TCD.IE	rasp-014.berry.scss.tcd.ie	14
COBREATH@TCD.IE	rasp-039.berry.scss.tcd.ie	14
MONTANGR@TCD.IE	rasp-039.berry.scss.tcd.ie	14
KALAPURF@TCD.IE	rasp-016.berry.scss.tcd.ie	16
MATHISN@TCD.IE	rasp-016.berry.scss.tcd.ie	16
ANMISHRA@TCD.IE	rasp-038.berry.scss.tcd.ie	16
RATHODN@TCD.IE	rasp-038.berry.scss.tcd.ie	16
ZHFU@TCD.IE	rasp-017.berry.scss.tcd.ie	17
AGRAWASA@TCD.IE	rasp-017.berry.scss.tcd.ie	17
NAARORA@TCD.IE	rasp-035.berry.scss.tcd.ie	17
NROBINSO@TCD.IE	rasp-037.berry.scss.tcd.ie	17
YANGY12@TCD.IE	rasp-018.berry.scss.tcd.ie	18
ABOTIP@TCD.IE	rasp-018.berry.scss.tcd.ie	18
EDJOHNSO@TCD.IE	rasp-036.berry.scss.tcd.ie	18
WANGX33@TCD.IE	rasp-036.berry.scss.tcd.ie	18
SRINIVAM@TCD.IE	rasp-019.berry.scss.tcd.ie	19
RVISWANA@TCD.IE	rasp-019.berry.scss.tcd.ie	19
BHARDWPR@TCD.IE	rasp-034.berry.scss.tcd.ie	19
JANAPARN@TCD.IE	rasp-034.berry.scss.tcd.ie	19
ZZHANG4@TCD.IE	rasp-021.berry.scss.tcd.ie	21
HABEEBRA@TCD.IE	rasp-021.berry.scss.tcd.ie	21
CICAIC@TCD.IE	rasp-020.berry.scss.tcd.ie	21
NOLLEK@TCD.IE	rasp-033.berry.scss.tcd.ie	21
CHENL8@TCD.IE	rasp-022.berry.scss.tcd.ie	22
GIRISHNG@TCD.IE	rasp-022.berry.scss.tcd.ie	22
SINGHT1@TCD.IE	rasp-032.berry.scss.tcd.ie	22
BHATNAGT@TCD.IE	rasp-032.berry.scss.tcd.ie	22
PNATARAJ@TCD.IE	rasp-024.berry.scss.tcd.ie	24
SINGHR6@TCD.IE	rasp-024.berry.scss.tcd.ie	24
BURDER@TCD.IE	rasp-031.berry.scss.tcd.ie	24
WELIN@TCD.IE	rasp-031.berry.scss.tcd.ie	24
EMMCDONA@TCD.IE	rasp-026.berry.scss.tcd.ie	26
BELLIKD@TCD.IE	rasp-026.berry.scss.tcd.ie	26
LIUY29@TCD.IE	rasp-030.berry.scss.tcd.ie	26
BANGARS@TCD.IE	rasp-030.berry.scss.tcd.ie	26
CJUNG@TCD.IE	rasp-028.berry.scss.tcd.ie	28
SRIVASTP@TCD.IE	rasp-028.berry.scss.tcd.ie	28
SOURAVS@TCD.IE	rasp-029.berry.scss.tcd.ie	28
KANKARID@TCD.IE	rasp-029.berry.scss.tcd.ie	28