Task (todo/done)

Tasks (for the team):

#	Task name	Details	Creation date	Completion date	Assignee	Status
-	Voting for BP	Request and follow up voting process.	21 Sep 2020	22 Sep 2020	Asif Mehmood	✅
		Project Approved: 22 Sep 2020				
-	Request for PTL	Request to initiate the PTL.	01 Oct 2020	01 Oct 2020	Asif Mehmood	✅
		Asif Mehmood got elected as PTL: 08 Oct 2020				
-	Setup PM	Setup the Physical Machine: • Ubuntu 20 (ubuntu-20.04.1-desktop-amd64) ✅	30 Oct 2020	30 Oct 2020	Asif Mehmood	✅
-	Create 3 VMs	1. Setup an hypervisor a. verify virtualization enabled ✅ b. install kvm/libvirtd ✅ 2. Create a network for VMs ✅ 3. Create 4 VMs (at start 3 VMs are enough) ✅ a. 192.168.122.11 - Master ✅ b. 192.168.122.101 - Vehicles/RSU(s)/BS(s) c. 192.168.122.111 - Edge-1 ✅ d. 192.168.122.211 - Edge-2 4. Test VMs connectivity ✅	06 Nov 2020	10 Nov 2020	Asif Mehmood	✅
-	Setup K8s cluster	Setup a Master and two worker nodes (links: link-1, link-2, etc) 1. disable swap (persistently) 2. setup the Multus as a CNI (using this link-1) 3. note down the available IP-ranges for container applications: a. range: w.x.y.z/a	06 Nov 2020	17 Nov 2020	Asif Mehmood	⚠️
-	Setup Jenkins	Setup Jenkins on PM.	02 Nov 2020	24 Nov 2020	Asif Mehmood	⚠️
-	Connect LF Server	Integrate the Linux Foundation Servers.	02 Nov 2020	24 Nov 2020	Asif Mehmood	⚠️
-	Push CICD logs	Confirmation of the CICD logs	02 Nov 2020	24 Nov 2020	Asif Mehmood	⚠️
-	Explore socket programming protocols in python	Explore the containers inter/cross domain protocol options to enable communication among each other.	01 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	Explore/Research K8s network options	Explore the networking plugin options that can be used in our proposed scenarios of vehicles: • Multus (multiple virtual interfaces) • OpenShift-SDN CNI • Links ◦ Multus link ◦ Openshift-SDN link • etc	01 Oct 2020	18 Oct 2020	Asif Mehmood	⚠️
-	Explore routing in DSRC-based communication	DSRC range: • RSU - 300m (link) • Vehicle - 15m (link) Routing considerations with DSRC/LTE both: • SDN-based routing application • Multi-hop approach (using tables)	28 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

-	Documentation (pages & subsections)	1. Architecture - figures/explanation ✅
		2. Components - figures/explanation
		3. Scenarios - figures/explanation
		  a. simple diagram to understand the scenarios ✅
		  b. technical aspect of the proposed scenarios
		4. V2X Communication - figure/explanation ✅
		5. Implementation - plan/approach
		  a. container vehicles
		  b. maps (Jeju/Udo islands) ✅
		  c. proximity services
		  d. broadcast content
		  e. epc on the edge sites
		  f. location prediction model
		  g. sdn
		6. Relevant Blueprints ✅
		7. Contributors ✅
		8. References ✅
		9. Ask Questions - table of questions ✅
		10. Tasks ✅
			01 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

-	Vehicle-info container
	
	(start/boot-priority = 1)
		1. Design the database
		2. Develop the scripts to create the database
		3. Containerize it into the docker hub ✅
		4. Setup a (dbeaver) plugin to access container database
		  a. Windows ✅
		  b. Ubuntu
		5. Expose the port (or make it accessible on some portal)
			26 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

-	Map container
	
	(start/boot-priority = 2)
		1. Downloaded .osm/.mbtile formatted files for Jeju/Udo Island ✅
		2. GIS-based maps
		  a. set locally ✅
		  b. containerize it (Folium-based map server) ✅
		  c. find .shp for Jeju/any city/area
		  d. use wgs84/epsg4326 format (geojson)
		  e. traffic data for vehicles (Jeju/any)
		  f. pandas, geopandas, folium
		  g. graphical analysis of traffic (map/graphs)
		  h. interactive layers (i.e. ___)
		3. Setup the OpenStreetMap (PostgreSQL). Steps to setup locally.
		  a. on local system
		  b. containerize it
		  c. make it accessible to the cars
		4. Analyze/correct the .osm maps for Jeju/Udo Islands
		5. Search ways for creating roads, intersection etc
		6. Implement roads. intersection etc
		7. Explore implementation options to dynamically move container vehicles
		  a. Consider the RSUs/BSs in this architecture
			10 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

-	Vehicle container(s) **(start/boot-priority = 3)**	Specifications:	07 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

1. Vehicle Class ✅
2. Attributes ✅
    a. name
    b. curr_location [long., lat.]
    c. junction_location [long., lat.]
    d. curr_velocity [m/s]
    e. direction [N/E/S/W/NE/ES/SW/WN]
    f. possible_moves [N/E/S/W/ES/SW/WN]
    g. net_d2d
    h. net_d2b
    i. net_d2p
    j. range_of_net_d2d
    k. etc.
3. Methods:
    - **turn**

Inputs	Outputs	Actions /Effects	Description
◦ vehicle id ◦ direction	next location	decrease velocity decelerate by some factor while turning update the location#	

    - **accelerate**

Inputs	Outputs	Actions /Effects	Description
◦ vehicle id ◦ direction ◦ acceleration factor	new location	increase velocity update the location#	

    - **broadcast**

Inputs	Outputs	Description
◦ vehicle id ◦ bits	none	The udp client will be responsible to broadcast the traffic to the gateway. The proximity/other service at the edge node is responsible to decide on which edge nodes does the traffic need to be broadcasted

    - **park/stop**

Inputs	Outputs	Actions /Effects	Description
		decrease velocity to zero update the location#	

    - **update the location**

Inputs	Outputs	Actions /Effects	Description

    - **sync. location to proximity server**

Inputs	Outputs	Actions /Effects	Description
◦ vehicle id ◦ location	response of success /failure	vehicle location must be updated on the proximity server	updates the current location to server after every 2 seconds.

    - **etc.**

Method details:

		1. Turn (to describe) 2. Accelerate (to describe) 3. Broadcast (to describe) 4. Park/Stop (to describe) 5. Update the location 6. Sync. the location to proximity server 7. etc.				
-	Map data processing/analysis	1. Junctions ✅ 2. Locations ✅ 3. Road track points 4. etc.	29 Oct 2020	24 Nov 2020	Asif Mehmood	⚠️
-	Proximity Service design with specifications	1. Specify the criteria of updating locations of container vehicles 2. Describe the the selected standard approach for implementing proximity service	08 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	Information: CVB vehicle implementation	Ask CVB team, what analogy do they use to create vehicles/devices.	27 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	SDN Controller	1. OpenShift 2. µONOS 3. others	28 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	Northbound Routing Application (container)	1. Explore the OpenShift-SDN CNI 2. Routing logic as a Northbound application 3. Apply routing to: a. vehicle container network interfaces b. RSU container network interfaces 4. Test the validity of routing	13 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	SDN-to-SDN communication	1. East-west communication 2. Mechanism to share information	27 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
-	Location Prediction	1. Finding datasets a. real-time b. simulated link-1, link-2, link-3 2. Processing/Analyzing datasets 3. Model details a. architecture? b. models: i. model A: 1. input(s): 2. output(s): ii. model B: 1. input(s): 2. output(s): iii. model C: 1. input(s): 2. output(s): iv. model D: 1. input(s): 2. output(s): v. model E: 1. input(s): 2. output(s): 4. Training a. training/testing data split b. training details 5. Testing a. testing time b. testing analysis 6. Validation/Verification a. define the validation metrics b. define the verification mechanism 7. Exposing model REST API(s) a. define the endpoints i. define/document the JSON formats required 8. Integration (basic) 9. Integration (testing functionality)	16 Oct 2020	18 Dec 2020	Muhammad Saqib	⚠️
-	Configurations	1. Docker-compose 2. Helm charts	27 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️

-	Scripts	1. Installation of basic packages: a. script to install kvm/libvirt ✅ b. script to install ansible ✅ c. script to install vagrant 2. Provision the infrastructure using: a. vagrant (primary option) b. ansible (secondary option) 3. To setup K8s cluster - using Ansible scripts: a. write a script to download/start 3 VMs b. write a script to install master/worker nodes node remotely c. write a script to setup the CNI plugin (if possible, configured with the chosen SDN controller) 4. To bring up the applications - using Helm-charts/Docker-compose: a. ml model b. sdn controller c. container mapserver d. container proximity- service e. container vehicle f. routing ml application 5. To deploy the SDN Northbound application - using ...	27 Oct 2020	18 Dec 2020	Asif Mehmood	⚠️
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-	Versions using for the blueprint	1. Ubuntu: a. Host: *Ubuntu 20.04 LTS: Focal Fossa* b. VMs: *Ubuntu 20.04 LTS: Focal Fossa* 2. Hypervisors: a. Qemu-kvm/libvirt: *4.2.1/6.0.0* b. Virtualbox: *6.1.16* i. platform packages: *6.1.16* (link) ii. Oracle VM virtualbox extension pack: *6.1.16* (link) 3. Infrastructure provisioners: a. vagrant *2.2.13* i. follow this link to solve secure boot problem using certificates 4. K8s: *v1.18.12* (binaries link) a. kubectl: b. kubelet: c. kubeadm: 5. Multus-CNI: *v3.6* (GitHub tag) 6. Docker: *19.03.12* a. sudo apt-get install docker-ce=5:19.03.12~3-0~ubuntu-focal 7. Ansible: *2.9.6* 8. ONOS: 9. Python: *3.8.x (x=1-to-5)* a. Dockerfile: *python-3.8.1* b. Ubuntu host: *python-3.8.5* 10. etc:	12 Nov 2020	30 Apr 2021	Asif Mehmood	💡
-	Setup KubeEdge-based K8s cluster	KubeEdge-based cluster with the above specified configuration	04 Jan 2021	30 Apr 2021	Asif Mehmood	💡
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-	Future considerations/directions: • MEC-based runtime resource orchestration /provisioning • Data analytics • Autonomousity • Much more...				Asif Mehmood	💡