ETH Robotics Summer School
Linux & ROS Cheat Sheet

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File Commands

$ **ls**	list contents of current directory
$ **ls -a**	list hidden contents of current directory
$ **cd $DIR**	change working directory to $DIR
$ **cd**	change working directory to home
$ **mkdir $DIR**	create a directory named $DIR
$ **pwd**	print working directory
$ **rm $FILE**	remove $FILE
$ **rm -r $DIR**	remove $DIR
$ **rm -f $FILE**	force remove $FILE
$ **rm -rf $DIR**	force remove $DIR
$ **cp $FILE $DIR**	copy $FILE to $DIR
$ **cp -r $DIR1 $DIR2**	copy $DIR1 to $DIR2 recursively
$ **mv $FILE $DIR**	move $FILE to $DIR
$ **ln -s $FILE $LINK**	create symbolic link $LINK to $FILE
$ **touch $FILE**	create $FILE
$ **cat $FILE**	view content of $FILE
$ **cat > $FILE**	write input into $FILE
$ **more $FILE**	print content of $FILE
$ **head $FILE**	print the first 10 lines of $FILE
$ **tail $FILE**	print the last 10 lines of $FILE
$ **gedit $FILE**	edit $FILE using GUI text editor
$ **vim $FILE**	edit $FILE using Vim

System Information

$ **env**		print environment variables
$ **date**		print system date and time
$ **man $COMMAND**		print user manual of $COMMAND
$ **whereis $APP**		print locations of $APP
$ **which $APP**		print executable file of $APP
$ **ps**		print process status
$ **ps -aux**		print all running process
$ **htop**		print currently running processes and more
path symbolic links	.	current directory
	..	parent directory
	~	home directory
	\	root directory
output direction	>	to a file (rewrite)
	>>	to a file (append)
	|	pipe output of first command to second

Linux Shell

Ctrl+Alt+T	launch a new terminal
Ctrl+C	kill the current process
Ctrl+Z	suspend the current process
fg	resume the suspended process in foreground
bg	resume the suspended process in background
Ctrl+D	log out of the current session
Ctrl+W	erase one word in the current line
Ctrl+U	erase the whole current line
Ctrl+R	reverse search in the previous commands
Ctrl+A	go to the beginning of the line
Ctrl+E	go to the end of the line
!!	execute the last command
exit	log out of the current session
clear	clear the terminal screen

Use **Ctrl+R** to reverse search, type part of a command and hit **Ctrl+R** repeatedly.
Ctrl+A is especially useful when you forget to add sudo before the command.

Terminator

Ctrl+Shift+E	split terminals vertically
Ctrl+Shift+O	split terminals horizontally
Ctrl+Shift+T	open a new tab
Ctrl+Shift+I	open a new window

Secure Shell (SSH)

$ **ssh $USER@$HOST**	connect to $HOST as $USER
$ **ssh $IP_ADDRESS**	connect to $IP_ADDRESS
$ **ssh -p $PORT $USER@$HOST**	connect to $HOST on $PORT as $USER
$ **ssh-copy-id $USER@$HOST**	add the key to $HOST as $USER

Package

$ **apt-get update**	synchronize package index files from sources
$ **apt-get upgrade**	install latest versions of installed packages
$ **apt-get install $PACKAGE**	install $PACKAGE
$ **dpkg -i $PACKAGE.deb**	install a Debian package $PACKAGE.deb
$ **./configure**	configure building settings
$ **make**	build the program from source code
$ **make install**	install the program

Searching

$ **grep $PATTERN $FILES**	search for $PATTERN in $FILES
$ **grep -r $PATTERN $DIR**	search for $PATTERN recursively in $DIR
$ **grep -n $PATTERN $FILES**	search for $PATTERN and print line numbers
$ **grep -C1 $PATTERN $FILES**	search for $PATTERN and print 1-line context
$ **$CMD | grep $PATTERN**	search for $PATTERN in $CMD's output
$ **locate $FILE_NAME**	find files whose name contain $FILE_NAME

Git

$ **git clone $URL**	clone the repository from $URL
$ **git status**	print current branch status $BRANCH
$ **git branch $BRANCH**	create a new branch named $BRANCH
$ **git checkout $BRANCH**	switch to the branch named $BRANCH
$ **git merge $BRANCH**	combine $BRANCH into the current one
$ **git fetch**	download all history from GitHub
$ **git merge**	combine remote branches into local branch
$ **git push**	upload all local branch commits to GitHub
$ **git pull**	update local branch from GitHub
$ **git log**	list version history for current branch
$ **git log --follow $FILE**	list version history for $FILE
$ **git show $COMMIT**	output content changes of $COMMIT
$ **git add $FILE**	stage $FILE
$ **git commit -m "$MESSAGE"**	commit staged file with $MESSAGE
$ **git reset $FILE**	reset $FILE
$ **git reset --hard**	reset all uncommitted changes
$ **git clean -fd**	recursively force remove unstaged files

Tips

Hitting **Tab** while typing a command, file name, and option will auto-complete it.
sudo (superuser do) runs command with elevated privilege.
tar (tape archive) deal with tape drives backup.
Appending **--help** after a command will print command usage help.

Docker

$	
$	
$	
$	
$	
$	

ROS Catkin Workspace

$ **roscd $PACKAGE**	change directory to $PACKAGE
$ **catkin build**	build the whole workspace
$ **catkin build $PACKAGE**	build $PACKAGE
$ **catkin clean**	clean the whole workspace
$ **catkin clean $PACKAGE**	clear $PACKAGE

Always remember to **$ source /catkin_ws/devel/setup.bash**.

ROS Run

$ **roscore**	invoke the core of ROS
$ **roslaunch $PACKAGE $LAUNCHFILE**	launch $LAUNCHFILE in $PACKAGE
$ **rosrun $PACKAGE $EXECUTABLE (\$PARAM:=\$VALUE)**	run node $EXECUTABLE from $PACKAGE (with $PARAM set to $VALUE)

ROS Environmental Variables

ROS_ROOT	location of core ROS packages
ROS_MASTER_URI	location of the master
ROS_PACKAGE_PATH	locations for more ROS packages
ROS_HOSTNAME	network address of a node
ROS_IP	IP address of a node

ROS Node

$ **rosnode ping $NODE**	test connectivity to $NODE
$ **rosnode list**	list active nodes
$ **rosnode info $NODE**	print information about $NODE
$ **rosnode machine**	list nodes running on the machine
$ **rosnode kill $NODE**	kill a running node

ROS Service

$ **rosservice list**	list active services
$ **rosservice call $SERVICE $ARGS**	call $SERVICE with $ARGS
$ **rosservice find $TYPE**	find services with $TYPE
$ **rosservice info $SERVICE**	print information about $SERVICE
$ **rosservice type $SERVICE**	print type of $SERVICE
$ **rosservice uri $SERVICE**	print uri of $SERVICE
$ **rossrv show $TYPE**	print structure of $TYPE

ROS Topic

$ **rostopic list**	print information about active topics
$ **rostopic bw $TOPIC**	display bandwidth used by $TOPIC
$ **rostopic echo $TOPIC**	print messages from $TOPIC
$ **rostopic find $TYPE**	find topics with $TYPE
$ **rostopic hz $TOPIC**	display publishing rate of $TOPIC
$ **rostopic info $TOPIC**	print information about $TOPIC
$ **rostopic pub $TOPIC**	publish data to $TOPIC
$ **rostopic type$TOPIC**	print type of $TOPIC
$ **rosmsg show $TYPE**	print structure of $TYPE

ROS Parameter

$ **rosparam list**	list all parameter names
$ **rosparam set $PARAM $VAL**	set $PARAM to $VAL
$ **rosparam get $PARAM**	print value of $PARAM
$ **rosparam load $YAML**	load parameters from $YAML
$ **rosparam dump $YAML**	dump parameters to $YAML
$ **rosparam delete $PARAM**	delete $PARAM

ROS Bag

$ **rosbag record $TOPIC**	record $TOPIC into bag
$ **rosbag info $BAG**	print content summary of $BAG
$ **rosbag play $BAG**	play back content of $BAG
$ **rosbag check $BAG**	check play-ability of $BAG in current system
$ **rosbag compress $BAG**	compress $BAG using BZ2
$ **rosbag decompress $BAG**	decompress $BAG using BZ2

When simulating in ROS, remember **$ set use_sim_time true** and to append **--clock**.

ROS Packge Structure

package.xml	manifest, dependencies and plugins
CMakeLists.txt	description of compilation procedure
src/	C and C++ source codes
build/	generated makefiles and support files
devel/	compiled binaries, libraries, headers
include/	C and C++ header files
scripts/	Python and bash scripts
config/	ymal configuration files
cfg/	dynamics reconfigure scripts
launch/	launch files

ROS Visualization Tools

$ **rviz**	3D visualization of data and models
$ **gzclient**	Gazebo GUI
$ **rqt**	powerful GUI tool
$ **rqt_plot**	simple and lightweight plotting
$ **rqt_bag**	visualize content of a bag
$ **rqt_image_view**	visualize camera images
$ **rqt_graph**	visualize computation graph

TODO

is git reset unstage or reset?

rosnode machine

CMakeList

catkin build / clean / make
ros variable

Compression

$ **tar cf** **$FILE.tar** **$FILES**	convert $FILES into $FILE.tar
$ **tar xf** **$FILE.tar**	extract files from $FILE.tar
$ **tar czf** **$FILE.tar.gz** **$FILES**	compress $FILES into $FILE.tar.gz using Gzip
$ **tar xfz** **$FILE.tar.gz**	extract files from $FILE.tar.gz using Gzip
$ **gzip** **$FILE**	compress $FILE and rename it as $FILE.gz
$ **gzip -d** **$FILE.gz**	decompress $FILE.gz back to $FILE

Network

$ **ip address**	print all internet protocol addresses
$ **ping** **$HOST**	ping $HOST and print results
$ **whois** **$DOMAIN**	print information about $DOMAIN
$ **dig** **$DOMAIN**	print DNS of $DOMAIN
$ **dig -x** **$HOST**	reverse lookup $HOST
$ **wget** **$FILE**	download $FILE