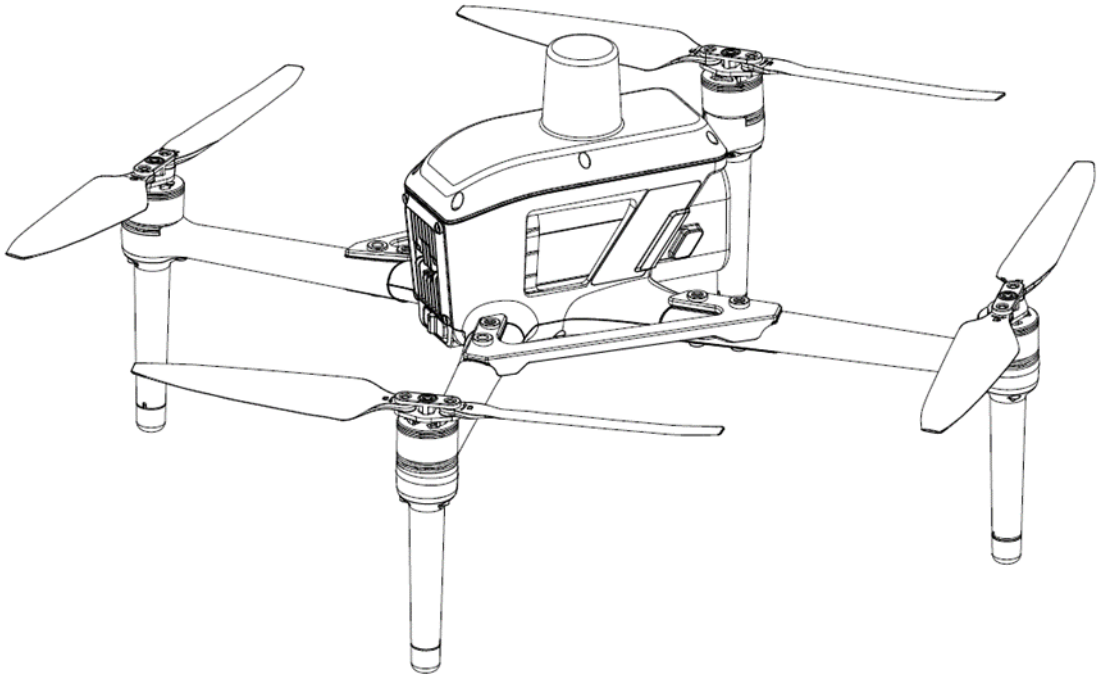
高巨创新
HIGH GREAT



RiFF Intelligent Flight Equipment

User Manual V1.0

(EN)

Declaration

Unless otherwise agreed, this manual is for use as guidance only, and all statements, information and suggestions in this manual do not constitute any express or implied warranty. The software used by users may have different functions due to different hardware versions, countries and regions, and usage authorizations.

For the latest version of this manual, please contact the Customer Service Department of Shenzhen HighGreat Innovation Technology Development Co., Ltd.

History of revision

Version	Date	Modify the description	Editor
V1.0	8/18/2024	First Version	Faidy

Contents

Instructions

The RiFF Intelligent Flight Equipment is a multi-purpose mounted airborne platform based on cluster formation flying. Including positioning system, communication system, power system and payload system. This description will specifically introduce the use of the drone and various auxiliary systems and related functions. The RiFF performance system involves a number of tool operations, please be sure to read this manual carefully.

Symbol description:

Note

Note: It is precaution in the use process. If it isnot operated according to the requirements, it will result in possible failure !

Prompt

Prompt: It is to better experience the function andperformance of the product during use!

1.RIFF Equipment specifications and instructions

1.1Drone

1.1.1 Product overview of drones

RiFF is a new cross-border multi-functional formation series of drones developed by High Great with traditional formation UAVs, RiFF has an innovative design that supports multiple types of mounted equipment for flight, including lights, lanterns, fireworks, pan-tilt head and smoke sprayer, flower spraying, and other functions.It is easy to assemble and disassemble, can be deployed quickly, and is suitable for a variety of uses, including formation performances and learning.The flexibility and versatility of RiFF intelligent aircraft make it a unique and practical drone product .

Functional Highlights:

- **Modular Design:** Modular design significantly enhances deployment speed and endurance, making task execution more efficient.
- **Load Diversification Design:** Various load options and a quick-release structure facilitate transportation and cater to diverse task scenarios.

- **Integrated Avionics Design:** The highly integrated avionics system is compact, lightweight, and robust against interference, enhancing flight stability and smoothness.
- **Three-Tier Electronic Fence Design:** The three-tier electronic fence—single aircraft, dance step, and no-fly zone—comprehensively ensures flight safety.
- **WIFI6 Low Power Technology:** WIFI6 low-power technology extends communication range and boosts signal stability.
- **Multi-frequency (Redundant) Technology:** Supports redundant multi-frequency communication links, allowing for up to four simultaneous connections, thus meeting the communication needs of various countries and regions.
- **High-precision Manufacturing Technology:**
  High-precision manufacturing techniques enhance the fuselage's stability and reliability. With an IP55 rating and core board components at IP67, it can withstand extreme flight conditions, ensuring stable and reliable performance.
- **Open Interface:** The CAN bus and communication protocol are open, enabling users to customize payloads to meet specific needs, thus enhancing the product's flexibility and customization options.

1.1.2 Specifications and parameters of drones

Specifications	HG-D04-EU
Weight(included battery, no load)	945g(±10g)
Maximum take-off weight	1800g
Wheelbase	358mm
Drone dimensions	493.1*493.1*192.8mm(Spreading paddles)
Motor specification	2312
Paddle	9450(collapsible)
Classification of wind resistance *①	≤ 7 Grade wind
Positioning mode	RTK （Support GPS, GLONASS, Galileo, Beidou multi-band）

Positioning accuracy		Horizontal ±5cm, vertical ±6cm
Battery	Capacity	5000mAh
	Voltage	14.4V
	Type	4S smart battery
	Weight	348g(±5g)
Suggested performance duration		10-25min
Maximum horizontal flight speed*②		21m/s
Maximum ascending flight speed		6m/s
Maximum descending flight speed		4m/s
Maximum Pitch Angle		35°
Maximum flight altitude		3000m
Minimum flight spacing		1.8m
Operating Frequency*③ (Select Configuration) &Power (EIRP)		WIFI: 5.150 GHz - 5.250 GHz;, 5.725-5.850GHz , Radio Digital Transmission: 863.15MHz-869.85MHz;902-928MHz 2.4GHz-2.476GHz,
Communication distance *④		WIFI ⩾700m 868M radio⩾ 1500m 900M radio⩾ 1500m 2.4G radio⩾ 1000 m
CANBUS Max output		DC16.8V 5A
Working temperature		-10~45°C
IMU		Double-IMU
Magnetometer		Double-magnetometer

Above data is measured in a standard experimental environment, and there may be some deviation in different environment.

① The wind resistance data is measured under hovering conditions in a standard wind tunnel laboratory.

② This speed is the maximum horizontal flight speed of non dance flying, and the maximum horizontal flight speed is 10m/s during dance flying,The maximum flight

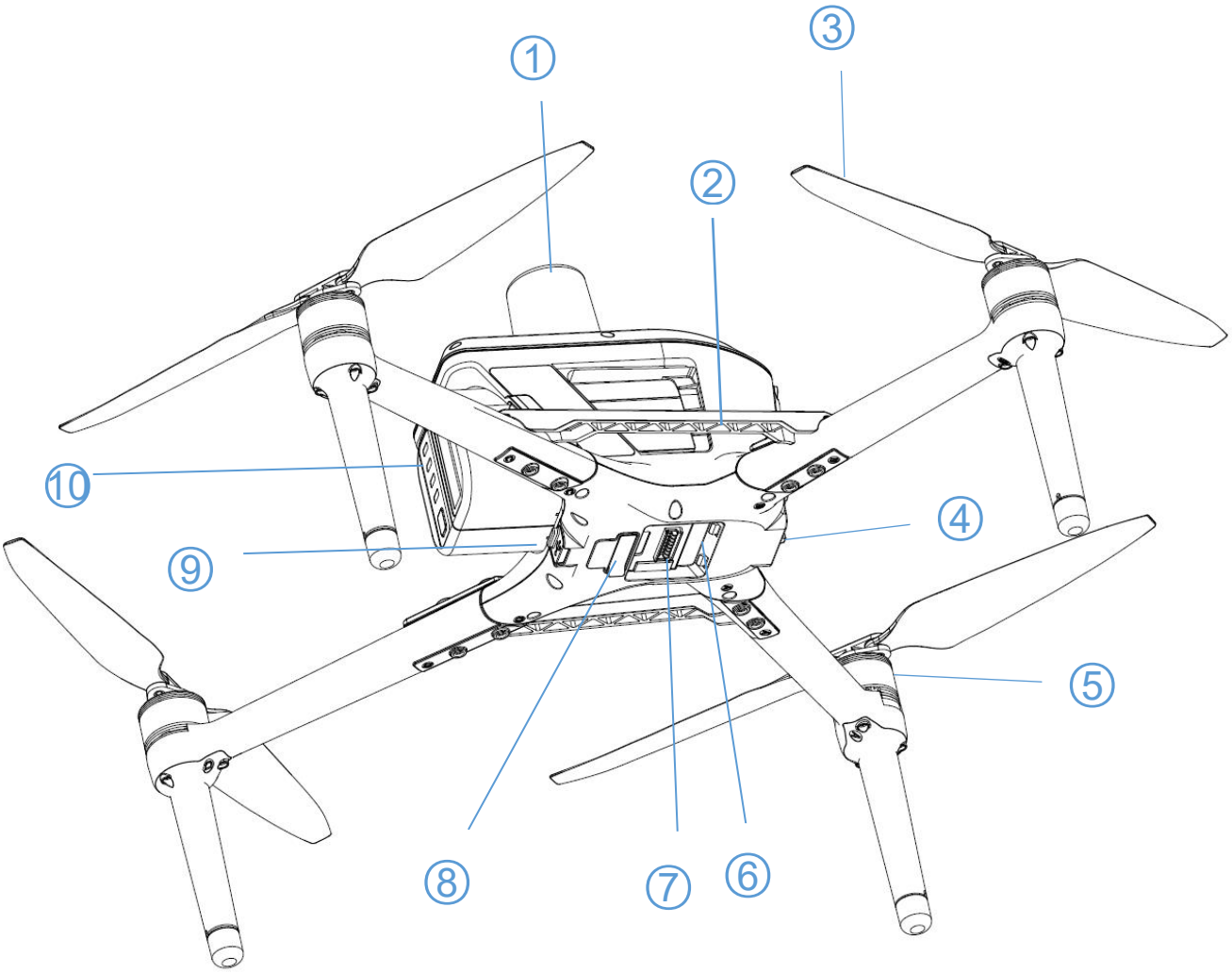
speed of the dance step air show is based on the actual dance step design safety.

③ Operating frequency and power vary according to different countries or regions, please refer to local laws and regulations.

④ This data is measured in an unobstructed environment under the FCC standard and in a non-interference scene. The WIFI communication distance depends on the configured AP model and number of RIFF flights, and the communication range of different AP models or number of RIFF are different. The communication range is intended to be used by the user as a distance reference when flying and does not commit to actual range.

Do not use it for a long time under high temperature above 40 ° C

1.1.3 Drones part names and Accessories Installation Instructions

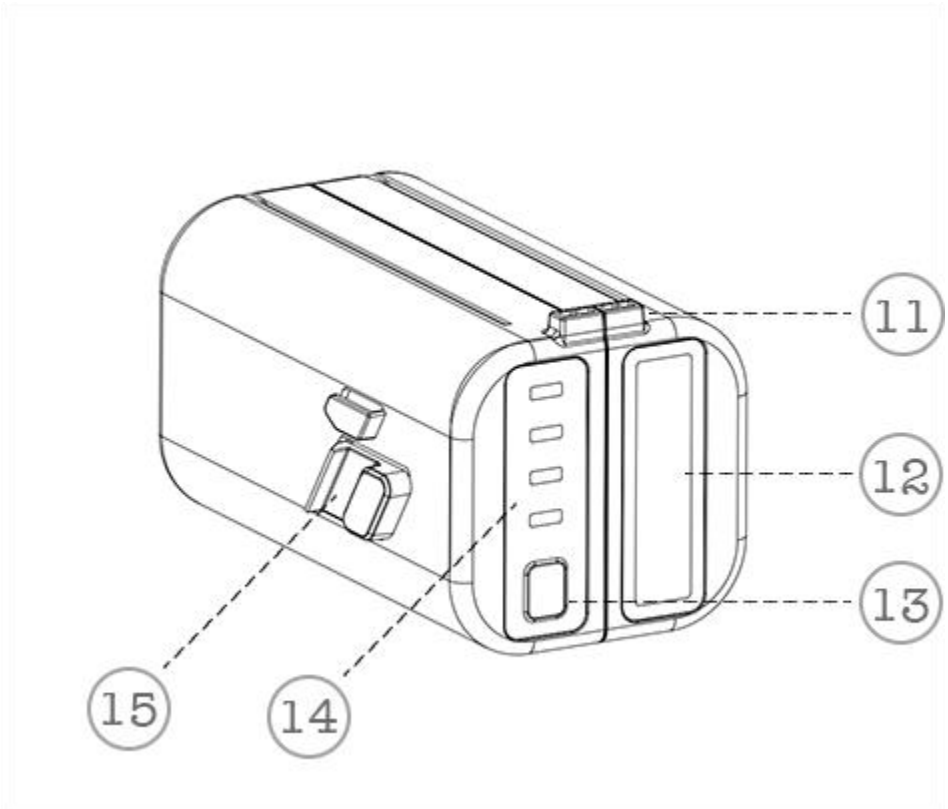


【1】RTK antenna 【2】Connection bracket 【3】Paddle

【4】Load Lock 【5】Motor 【6】load-bearing groove

【7】Lighting Load Interface 【8】CANBUS output interface

【9】Type-C data interface 【10】Battery



【11】Battery Limiter 【12】RIFF Status Indicator 【13】Battery switch
【14】Battery level display 【15】Battery Mounting Lock Clip

Drone startup/Shutdown instructions

Startup: Insert the drone's battery directly into the battery compartment in the off state, then press the battery switch, the drone will make a switch on sound and light up. You can also insert the battery directly into the battery compartment in the power on state first, if you press the battery on button for more than 90 seconds without inserting it into the battery compartment, the battery will automatically turn off and you need to press the battery on button again to turn on the drone.

Shut down: Press the battery mounting lock clip and unplug the battery directly to shut down. (Long press the battery switch for 3 seconds after unplugging the

battery to switch off the battery or the battery will automatically switch off after 90 seconds under no-load condition. Note: If the battery is loaded into the drone and the battery detects discharge, pressing the battery switch at this time can't carry out the shutdown)

Restart: It can be restarted by the upper computer or unplugging the battery.

Replacement and Installation of Paddles

The new propeller paddles must rotate in the same direction as the original propeller paddles. Attention should be paid to clockwise and counterclockwise directions.

Pay attention to whether the propeller screws are loose or not, so as to avoid the danger caused by paddle falling off in flight. Every 10 hours of accumulated flight, the paddles must be checked and reinforced.

※ Pay attention to whether the propeller fixing screws are loose, so as to avoid the danger caused by the propeller falling off in flight. Check with a screwdriver every 10 hours of flight, and tighten the loose screws at the same time.

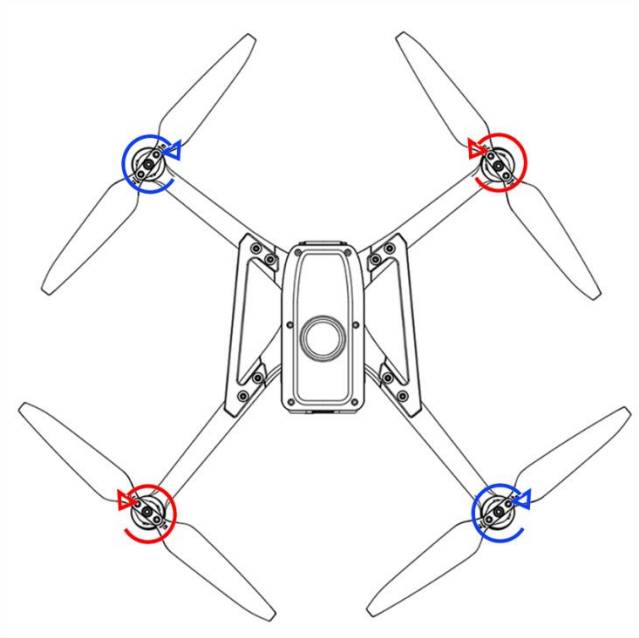
Distinguish betweenCW and CCW paddles: A group of CW and CCW paddles is used in this drone, with 2PCS in each group. Please pay attention to distinguish them when installing.

paddle

CW paddle

CCW paddle

Install the paddle in the manner shown below and lock it in place.



The paddles at ends of the red line are CWW. The paddles at ends of the bule line are CW. Please check that the installation is complete and that there are no installation errors.

Payload Installation

For the installation of the payload, see the relevant instructions for each payload.

1.1.4Drone calibration and lamp signal

Non-calibration status lights：

1. After inserting USB and connecting successfully, the white light flashes at high frequency for 2 seconds. (All lights can be interrupted, and they will return to their original state after flashing for 2 seconds)
2. When the battery level is less than 5%, it flashes red
3. Magnetometer failure: yellow and green flash alternately

4. IMU, barometer and other hardware failures: white, blue and purple flashes quickly.

5. The white light is always on when the AP is not connected, and the white light flash slowly when the server is not connected

6. Upgrading the flight control and transmitting the dance steps: the purple light is normally on (in case the communication is occupied in the process of upgrading or transmitting, the instructions of the upper computer may not be processed)

7. Auto numbering

7.1) Activate the auto numbering function, calibrate the No. 0 drone, on which the red, green and blue lights alternate rapidly. When the numbering is completed over 90%, the server will send a light control instruction, commanding the same light color to be displayed in the same row or in the same row and lighting red, green, and the secondary shift control will be performed on the lights in the same row or in the same row (to prevent dead lights, the rows and columns are of the same color)

7.2) Series numbers that are not within the specified range of dance steps (i.e., the number of drones are more than the number of dance steps): orange-red (RGB: 255, 61, 0) lights will be normally on.

7.3) After auto numbering is stopped, all lights return to their original state.

※ In the process of number matching, if the first, second, third, fourth and fifth lights with high priority appear in an drone, the auto numbering lamp signal will be lit according to the lights with high priority.

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8. Manually modify the serial number (including matching the serial number through USB), and the blue color is normally on for 4 seconds after successful matching.

9. When the upper computer selects the drone, the orange-red (RGB: 255, 61, 0) light flashes; when the selection is closed, the light goes off; if there is an instruction from the upper computer, it will light up according to the instruction.

10. Prepare for take-off: the forest green is normally on.

11. Countdown to take-off: the indigo is normally on.

12. During the flight of dance steps, only the lights of dance steps shall be executed, and no other light control instructions shall be executed.

13. In the dance step, when the battery level is low, the lights are turned off and the drone lands. If the drone positioning is abnormal, the lights will be turned off and the drone will land.

14. If there are duplicate drone numbers, the orange-red (RGB: 255, 61, 0) lights are normally on.

15. drone positioning status:

Fix: green light is normally on

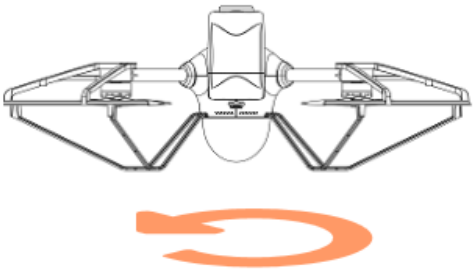
Float: yellow light is normally on

GPS: purple light flashes

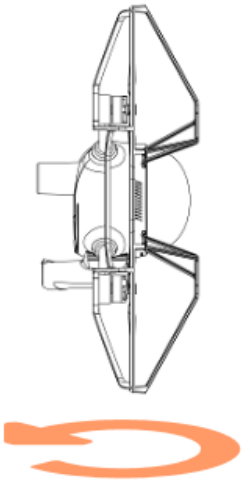
Calibration status: (note: when entering a calibration status, it will be no longer controlled by external lights)

A. Calibration magnetometer

Send the magnetic calibration instruction through the upper computer, and rotate the drone as shown in the following figures:



Horizontal calibration



Vertical calibration

1. Horizontal calibration: the blue light is normally on. Rotate the drone horizontally as shown above until the blue light flashes.

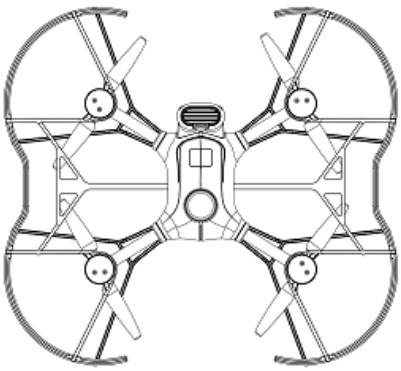
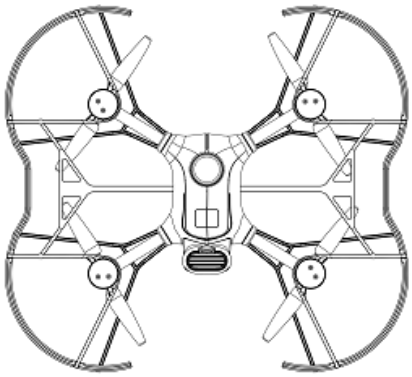
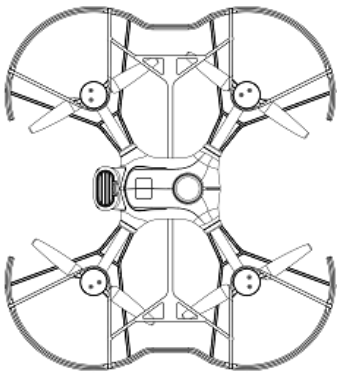
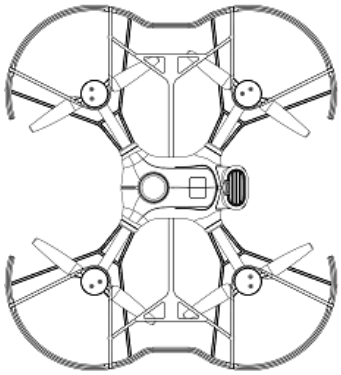
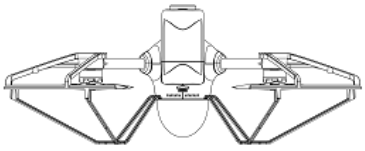
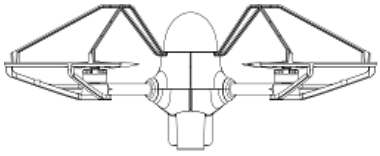
2. Vertical calibration: the blue light flashes. Rotate the drone vertically as shown above until the exit blue light flashes.

3. Calibration succeeded: return to the original lighting status.

4. Calibration failure: it will be always in the calibration status. For example, if the vertical calibration is unsuccessful, the blue light flashes until it receives the calibration exit instruction.

B、IMU calibration

Send the IMU calibration instruction through the upper computer, and then put the six drones of the drone horizontally and statically as shown in the following figures:

1. When the previous one is detected to be uncalibrated, the yellow light is normally on (the green light is normally on after calibration is completed); When the previous one is detected to be calibrated, the green light is normally on;

2. When the previous data acquisition is finished, the motor sounds (at the

same time, the green light is normally on). After the data acquisition of all six drones is completed, and the motor will send out a sound prompt of self-inspection.

3. If the final calibration is successful, the green light flashes for three seconds. If the final calibration fails, the red light flashes for three seconds.

1.1.5 Environmental requirements for drones

(1) The working temperature of drone and antenna is -10~+45℃, thus it shall be avoided in use under high temperature and sun exposure on the ground and long-term use at low temperature.

(2) It is not recommended to use it in dusty weather and rainy days.

(3) In case of insisting on using it in light rain, the drone shall be laid flat to ensure that no water can enter the interior, the rainwater must be wiped, and measures must be taken to dry it after use.

(4) If the tested wind speed in the air is continuously greater than 10 m/s before take-off, the drone shall be avoided from taking off. At this time, the drone has reached the maximum flight speed, which is extremely easy to cause danger.

(5) To avoid the danger of electric shock, it shall not be used in bad weather to avoid equipment damage.

1.1.6 Storage and transportation requirements

(1) The daily storage temperature of drone: -20~+50℃
(2) Relative humidity: (10-90) % RH (non-condensation).
(3) Pay attention to dust and moisture prevention.
(4) Pack it in a box with shock absorption function to ensure that it is in good condition after transportation.
(5) When drone and antenna are highly integrated equipment, attention shall be paid to water and moisture and fire prevention in use, Do not store and transport the drone with batteries! The flight packing box shall be prevented from falling, being knocked down or collided during loading, unloading, handling and transportation, which will cause the drone to be stressed by violent impact, thereby causing damage to internal sensor connecting wires or devices possibly.

1.1.7Maintenance requirements

(1) When taking the drone, both sides of the fuselage shall be held by hand instead of holding the antenna by hand to avoid the antenna being stressed.

(2) When cleaning the drone and antenna, the battery shall be removed, and they shall be wiped with a clean towel. The dirty part of the shell can be gently wiped with alcohol.

(3) Attention shall be paid to dust prevention when using and storing drone and antenna, because the motor is exposed. To prevent bearings from being worn or stuck, high-pressure air guns shall be used for cleaning in time according to dust conditions after one or more flights.

(4) Drone paddles are prone to fatigue, they shall be checked in time after flying a certain number of sorties (about 90 sorties). In case of obvious damage or deformation, paddles shall be replaced in time. When replacing paddles, front and rear paddles shall be found out, and it is not allowed to install them incorrectly.

(5) Please use the supporting special battery, and do not modify and disassemble it without permission.

(6) Due to the vibration environment of flight and transportation, it is necessary to check the tightness of various fixing screws on the drone shell and snap rings on the arm after flying for a certain number of sorties (about 30 sorties). Please use a little force when tightening screws, but not too much force.

(7) When cleaning the drone lampshade, it is not allowed to pinch and squeeze both sides of the lampshade so as not to damage the components on the lampboard.

(8) The drone cannot be placed upside down, so as to avoid the damage of the drone antenna due to stress.

(9) After the drone is used for about 30 sorties, the arm shall be slightly twisted by hand to check whether the connections at both ends are obviously loose.

(10) If the drone has worked in light rain or humid environment, measures must be taken to dry it to avoid damage to the interior of the drone due to inflowing water or damp.

(11) Regularly check the tightness of the mounting interface installation.

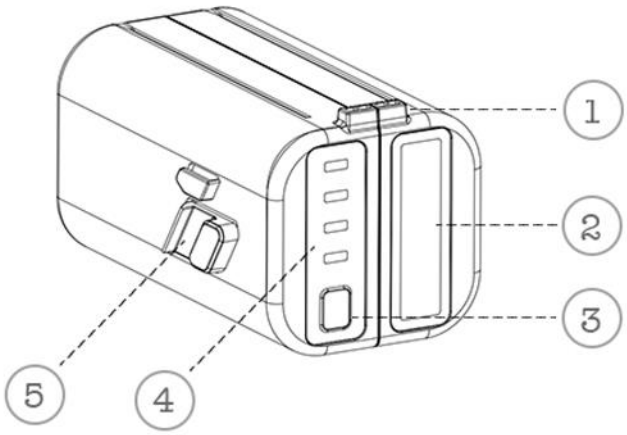
(12) After the formation flight in low temperature environment and sub-zero

environment, pay attention to drying the drone before placing the drone in a relatively warm indoor environment, otherwise it may cause the drone parts to have a large temperature difference and reverse moisture.

1.2 Battery

1.2.1 Product overview of battery

The battery of drone is that with rated capacity of 5000 mAh and nominal voltage of 14.4 V specially designed for RIFF.



【1】Battery Limiter 【2】RIFF Status Indicator 【3】Battery switch
【4】Battery level display 【5】Battery Mounting Lock Clip

1.2.2 Battery Specifications and parameters

Item	pack	
Specifications	Li-ion/4S1P 3350mAh	
Design voltage	14.4V	
Design capacity	5000mAh	
Weight	348g（±5g）	
Maximum rate discharge	5C	
Maximum discharge current	25A(Without temperature cut)	
Discharge cutoff voltage	10V	
Charging voltage	16.8V	
Charging current	3A	
Maximum Chargcurrent	6A	
Cell Impedance	<200mΩ	
0perating temperature	Charge	0～40℃
	Discharge	-10～45℃
Storage temperature	1 month	-20～60℃
	3 month	-20～45℃
	1 year	-20～20℃

※ When the battery is in a low temperature environment, the flight time of the drone will be shortened, and the service life of the battery will be shortened. Please pay attention to the battery insulation when using it below 0 degrees, and the flight performance time should not exceed 15 minutes (less than 7 degrees wind conditions , the battery is within the valid life cycle), please try to test the battery life on the spot before the performance.

1.2.3 Battery level indicator and function

Battery switch

1. Battery on

Click the battery switch to turn it on. The power indicator lights up for 5 seconds and then goes out.

(1) After turning on, the battery is detected to have been connected with the airdrone, the battery remains on, and the power indicator is normally on according to the definition of power indicator.

2. Battery off

(1) When the battery is on, press and hold the battery on/off key until the power indicator goes out

(2) In the battery-on state, if it is unable to detect the connection between the battery and the drone, the battery will automatically turned off after 90 seconds. Press this button again to activate it and to power on.

3. Drone status indicator

Valid when the battery is plugged into the drone and is used to indicate the current status of the drone. See here for a description of the relevant light language. 1.1.4Drone calibration and lamp signal

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※ If the battery is not used for a long time, please charge the battery to 50%, and press and hold the battery switch to shut down, so as to avoid battery damage caused by over-discharge.

Battery charging

Please use the special charging box provided by HighGreat for charging. Refer to the charging box instruction for the use of the charging box.

Battery level indicator

Definition of battery level indicator: the color of battery level indicator is green

Charging: (The charging box was adopted for one-to-many charging, and the use of charging box is explained separately)

Capacity	LED1	LED2	LED3	LED4
0-30%	Flashing	Off	Off	Off
30-60%	ON	Flashing	Off	Off

60-90%	ON	ON	Flashing	Off
90-100%	ON	ON	ON	Flashing
Charging completed	ON	ON	ON	ON
Abnormal charging	Flashing	Flashing	Flashing	Flashing

Discharging:

Capacity	LED1	LED2	LED3	LED4
100-90%	ON	ON	ON	ON
90-60%	ON	ON	ON	Off
60-30%	ON	ON	Off	Off
30-5%	ON	Off	Off	Off
＜5%	Flashing	Off	Off	Off

1.2.4 Environmental and maintenance requirements for battery

Work and use precautions

(1) The temperature range during discharge is -10~+45℃.

(2) Batteries with bulging, deformation, leakage or large voltage difference cannot be discharged.

(3) The lower limit voltage of discharge shall not be lower than 2.8 V, and the surface temperature of battery after high current discharge shall not be higher than 80℃.

(4) If a battery really needs to be used in a low temperature environment, the battery can be insulated first, then it is taken out and powered on immediately, so as to avoid insufficient battery activity and low power.

Charging environment requirements

(1) When charging, the temperature range is 0~+40℃, and it is best to charge it in an air-conditioning environment at 15℃-30℃.

(2) Batteries with bulging, deformation and leakage cannot be charged; they shall be checked first after charging at room temperature. If they are hot just after discharging, they need to be cooled for 10-20min before charging.

(3) When charging, there shall be someone on duty, and he shall have high fire awareness and be responsible for fire safety.

1.2.5 Storage environment and transportation requirements

Storage environment requirements

(1) Use of separate warehouses for storage of batteries, Attention shall be paid to keeping the warehouse dry, clean and not crowded. It is recommended to keep the gap between boxes at a distance of (0.5-0.8) m.

(2) The warehouse shall be equipped with: fire sand, asbestos felt, asbestos gloves, crucible tongs and masks.

(3) Storage environment temperature of battery: 20℃ ± 5℃, relative humidity: (65 ± 20) % RH.

Transportation requirements

(1) Filling and anti-collision measures shall be taken for the transported batteries to avoid their severe collision or vibrations.

(2) If the shell is damaged, electrolyte gas is smelled, and electrolyte leaks, etc., the battery shall not be used.

(3) The battery with electrolyte leakage or electrolyte odor shall be kept away from fire sources to avoid fire.

(4) The battery shall be transported at about 50% of power.

(5) Batteries and drone equipment should be shipped separately.

1.2.6 Battery maintenance requirements

(1) It is necessary to regularly check the appearance and structure of the battery. The battery with damaged or bulged structure or poor interface will no longer be used; dust on the interface shall be blown with an air gun.

(2) Batteries with abnormal charging, unchargeable condition or damaged interface can no longer be used.

(3) Usually, the battery has a certain lifespan, and it depends on the charging and discharging environment when the user uses it. Too high or too low temperature environment will shorten the battery life. Under normal operating temperature and effective maintenance conditions, the battery should be out of service after the number of charging and discharging cycles reaches 200 times, in order to ensure flight safety, please check the battery life after the number of charging and discharging cycles reaches 100 times, such as a reduction of about 20% of the duration, it is recommended that the battery be replaced.

(4) Please activate the battery once every 3 months according to the method: fully charge the battery, let it stand for 10 minutes, then plug in the

drone and discharge it to 5% of power, let it stand for 30 minutes, and finally charge it to about 50% (two bars of power) for storage.

(5) The warranty period of battery: The warranty period of battery is 6 months after leaving the factory. Promise that the Company will be responsible for replacing the battery with its own quality problem during the warranty period, and if the problem arises due to misuse or destructive testing by users, it will not be covered.

1.2.7Other precautions for battery use

Please read the following precautions carefully to ensure the correct use of polymer lithium ion batteries. HighGreat Innovation will not be responsible for any problems arising from violation of the following precautions.

※ It is prohibited to use, transport or store batteries other than in accordance with the instructions in the manual.

※ Do not put the battery in water or wet it!

※ Do not charge the battery under fire or extremely hot conditions! Do not use or store batteries near heat sources (such as fires or heaters)! If the battery leaks or emits peculiar smell, it shall be immediately removed from the place close to the open flame;

※ Please use a special charger!

※ Do not connect positive and negative poles backwards!

※ Do not connect the battery directly to the wall socket or car cigarette lighter socket!

※ Do not put the battery into the fire or heat the battery!

※ It is forbidden to short-circuit the positive and negative electrodes of the battery with wires or other metal objects, and transport or store the battery with necklaces, hairpins or other metal objects!

※ It is forbidden to puncture the battery case with nails or other sharp objects, and hammer or tread the battery!

※ It is forbidden to hit, throw or cause the battery to be mechanically shaken!

※ It is forbidden to solder the battery terminals directly!

※ It is forbidden to disassemble the battery in any way!

※ It is forbidden to put batteries in microwave ovens or pressure vessels!

※ It is forbidden to use it in combination with one-shot batteries (such as dry batteries) or batteries with different capacities, models and varieties!

※ If the battery emits peculiar smell, heats, deforms, discolors or has any other abnormalities, it shall not be used; if the battery is in use or charged, it shall be immediately removed from the appliance or charger, with its use stopped!

※ Do not use batteries in extremely hot environment, such as cars in direct sunlight or hot days. Otherwise, the battery will overheat and may catch fire (be ignited), which will affect its performance and shorten its service life.

※ If electrolyte enters your eyes after battery leakage, they shall not be scrubbed, but shall be rinsed with water, with medical assistance sought immediately. If eyes are not handled in time, they will be hurt.

※ The battery can only be used under specified conditions, otherwise its performance will be reduced or its service life will be shortened.

※ Non-professionals shall not dissect the battery cell, otherwise it may lead to internal short circuit, and even further inflation, fire and other problems;

※ Theoretically, there is no flowing electrolyte in polymer lithium battery, but in case of electrolyte leakage and contact with skin, eyes or other parts of the body, the electrolyte shall be rinsed with clear water immediately, with medical assistance sought immediately;

※ In any case, it is not allowed to burn the battery cell or put it into the fire, otherwise it will cause the battery cell to burn, which is very dangerous and shall be absolutely prohibited;

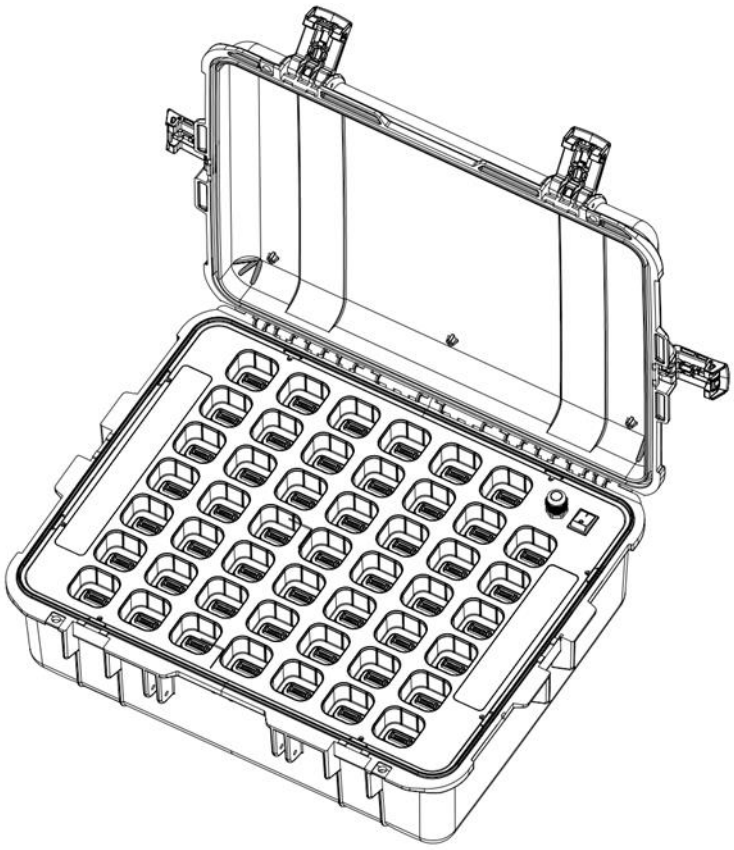
※ Do not soak the battery cell in liquid, such as fresh water, seawater, beverage (fruit juice, coffee, etc.).

※ Please refer to appendix 2 for the battery maintenance record form. If necessary, the customer can make a form to record the maintenance status by himself.

1.3 Battery Charging Box

1.3.1 Product overview of battery charging box

This specification applies to RIFF battery charging boxes. With high efficiency and reliability and protection functions such as short circuit protection and overcurrent protection, it can charge 48pcs batteries at the same time. (Must be the company's original battery).



battery charging box

1.3.2 Electrical Specification

INPUT SPECIFICATION

Input voltage range	85Vac - 264Vac
Rated voltage	100Vac / 240Vac
Input frequency range	47Hz - 63Hz
Rated input frequency	50Hz / 60Hz
Input current	27A/110Vac& 14A/220Vac @ full loading
No Load Input Power	50W max.@ no loading，rated voltage
No Load Input current	220mA max.@ no loading，rated voltage
Full load power	2700W
Inrush current	60A type peak @ 220Vac Input，cold start

OUTPUT SPECIFICATION

Rated Output

Rated Output Voltage （Vdc）	Output Voltage Range （Vdc）	Output Ripple & Noise (mV)	Rated Output Current (A)
16.8	10-16.8	≤200	3.0(220Vac)

Mechanical Rrquirement and Weight：

The power supply size: L * W * H =630mm * 502mm * 225mm ；

Input connector：Three pins

Weight:The finished charging box is about 13.8kg .

※ Note that during the charging process, do not turn on the main power switch after all the batteries are filled at the same time, you should turn on the power first and then put them in one by one.

※ It needs about 2H to fully charge battery from a zero capacity.

※ The battery needs to be on duty during the charging process! Not to be used unattended.

Protection Feature：

Output Short circuit protection:

The power supply will be auto recovered after short circuit faults remove.

Over current Protection:

The power supply will be auto recovered after over current faults remove.

1.3.3 Environmental and Maintenance Requirements of Battery Charging Box

(1) Temperature: -10℃-40℃, it is best to use the box in an air-conditioning room.

(2) The battery charging box belongs to highly integrated equipment, thus attention shall be paid to electrical safety when using it.

(3) The maximum power of the battery charging box is 2,000 W, thus it is a high-power electrical appliance. Attention shall be paid to whether the power supply is satisfied when using it, and to the safety of using electricity. (The rated power of this product is 1,920 W).

(4) It shall not be used in dusty environment.

(5) To avoid the danger of electric shock, it shall not be used in severe lightning weather.

(6) Attention shall be paid to electromagnetic interference keeping far away from high-frequency, high-power and high-current equipment.

(7) It is better to keep the ambient temperature at 5-30℃ as far as possible when charging. There is a green charging indicator light at the battery charging base to show the charging quantity of a single battery. When the four indicator lights are on for a long time, it means that the charging is over.

1.3.4 Storage and transportation

(1) The power switch shall be turned off when storing, with the upper cover covered and buckled and the funnel or box used to prevent dust.

(2) Boxes with shock absorption function shall be used to pack it well when transporting, so as to ensure that it is in good condition after transportation.

(3) The battery charging box is a highly integrated device, thus attention shall be paid to moisture prevention in its use to prevent impact and damage to internal sensors.

1.3.5 Maintenance requirements of battery charging box

(1) There is a fuse at the plug of the battery charging box to prevent the danger caused by short circuit of equipment. Attention shall be paid to timely replacement and inspection to prevent accidental electric shock.

(2) It is necessary to check whether there is melting at the socket of the power cord, and if so, the power cord shall be replaced in time.

(3) It is necessary to check whether there is any abnormality in the switch of charging box and the plug of power cord, and if so, it needs to be maintained by the manufacturer.

(4) The battery charging box is equipped with a heat dissipation and exhaust device, thus attention shall be paid to whether it can work normally, and if it is abnormal, it needs to be maintained by the manufacturer.

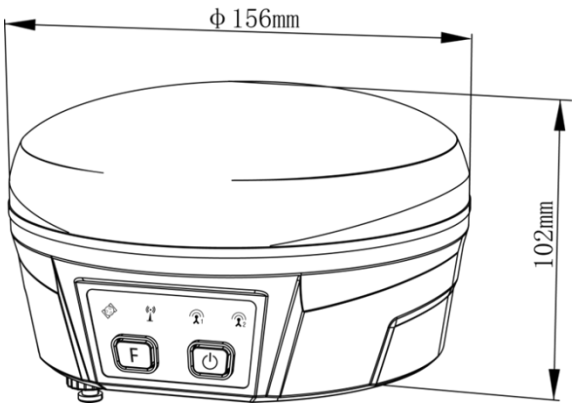
(5) When charging, the power supply of the charging box shall be turned on first, and then the batteries shall be inserted one by one. It is not allowed to insert the batteries full before turning on the switch to prevent danger caused by insufficient power supply.

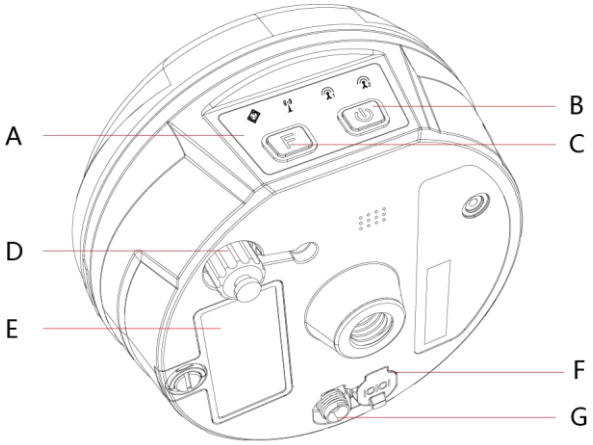
(6) The charging box shall be kept clean and tidy. If necessary, an air gun or vacuum cleaner can be used to remove dust.

1.4 Base Station

1.4.1 Product overview of base station

The ground base station is mainly used to send RTCM high-precision positioning signals to drones. The system is composed of a host, mobile power supply, a tripod, charging cables, antennas and other parts. The finished installation is shown in the figure.





A. indicator B. power C. radio switching key

D. external antenna port for radio 2

G. reserved external antenna port

F. LEMO (7-pin) port (data + charging) shown below:

Note:

*The radio 2 (868M/920M or 2.4G) antenna requires an external antenna. Please ensure that it is correctly installed in the D position indicated in the

illustration. Do not connect it incorrectly, otherwise it will affect flight positioning.

*The male head of LEMO FGG can go into the female one, with both red marks aligned properly.

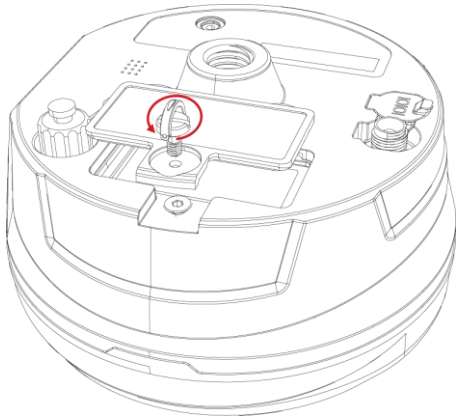
1.4.2 Parameters

GNSS	Mosaic-X5	Supports BDS B1/B2/B3, GPS L1/L2/L5, GLONASS L1/L2, Galileo E1/E5a/E5b, SBAS L1 and QZSS L1/L2/L5, with full system and full frequency point signal receiving and solving.
Radio	920M/868M/2.4G, 900M	Supports multi-frequency radio optional
Indicator	Power indicator	Solid green indicates power on
	PBC board indicator	Flashing green indicates normal outdoor positioning
	Radio indicator	Indicates the status of data transmission corresponding to different radio frequencies
	RTCM indicator	The blue indicator blinks after the Mosaic board can work properly
Battery	specifications	7.4V, 9750mAh
	Battery life	The battery sustains 4.5 hours when the two radios work at the same time, and 7 hours when only one radio works
Environmental characteristics	Working temperature	-10℃~+50℃
	Storage temperature	-30℃~+60℃(built-in lithium battery for long-term storage 20 ± 5 ° C)
	Quake proof	Resists 1.5m falls with the bar
	Grade three	IP45
Physical characteristics	Materials	Magnesium alloy shell +ABS/PC plastic cover
	Dimensions	156mm*156mm*102mm
	Weight	1KG
Port character	TNC	Two
	LEMO connector	One

GNSS	Mosaic-X5	Supports BDS B1/B2/B3, GPS L1/L2/L5, GLONASS L1/L2, Galileo E1/E5a/E5b, SBAS L1 and QZSS L1/L2/L5, with full system and full frequency point signal receiving and solving.
Radio	920M/868M/2.4G, 900M	Supports multi-frequency radio optional
istics		
Parts	Host computer	One
	Power/USB wire (LEMO connector transforming to DC port) of the portable charger	One
	Adapter	One
	Certificate	One

1.4.3 Directions for use

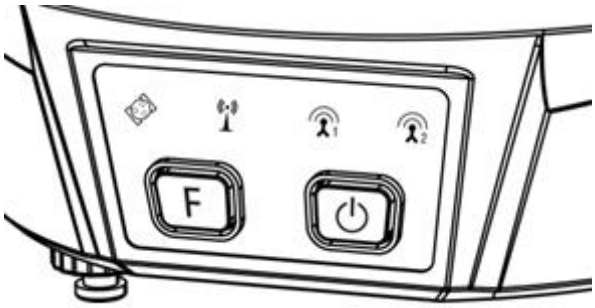
1.4.3.1 Installation of TF card and radio antenna



- TF card (for storing base station log data) has been installed on the main board before delivery;
- When used radio 1(900M), the internal antenna would function automatically. When using radio 2 frequencies, an external antenna is required to access the D connector.

  Note: The antenna does not support hot-swapping, please do not plug and unplug the antenna with electricity. If you are using a secondary radio, you must install the antenna first before switching on the power.

1.4.3.2 Key and indicator description



Item	Function	Roles or modes
	Charge Reporting	Short press Charge Reporting, the machine would give low battery alert (once very 30s) when the charge is lower than 10%.
	Power On/off	Long press Power On/off
	Charging mode indication	Power-on mode: the yellow indicator blinks at 2Hz during charging Power-off mode: the red indicator blinks at 20Hz during charging, if the charge is lower than 10%,
	Radio switch	Power-on mode: Long press the switch to shut off the radio 2, and F red indicator is on Default power-on mode: The radio 2 is on, and F red indicator is off
	Data correction indicator	Positioning mode: the blue indicator blinks after one second Indoor mode: the green indicator is off
	Data link one indicator	Positioning mode: the green indicator blinks one second after the radio 1 can receive differential data properly Indoor mode: the green indicator blinks once every three seconds

	Data link two indicator	Positioning mode: the green indicator blinks one second after the radio 2 can receive differential data properly Indoor mode: the green indicator goes off
	Mosaic indicator	Positioning mode: the green indicator blinks one second after entering the positioning mode Indoor mode: the green indicator blinks once every three seconds

1.4.3.3 Power on/off instructions

Power on: long press the power switch, do not release it until the system gives an voice prompt Power On, then the station starts working, and the Power On indicator on the panel goes solid green.

Power off: long press the power switch until the system gives an voice prompt Power Off, and the Power On indicator on the panel goes off.

Forced power off: when forgetting to shut off the station or the station cannot be normally shut off due to any breakdown, take the equipment indoors or block the antennas, wait five minutes, and the station would automatically be shut off.

1.4.3.4 Voice broadcasting instructions

In the power on/off mode, short press Power On, the equipment would give an voice prompt about current battery charge. The base station can automatically choose Chinese or English as broadcasting language according to the time zone of the location.

1.4.3.5 Press keys to set up radio frequencies (type of data link)

Set up the type of the radio via F key on the panel as well as red indicator prompt.

(1) Default power-on mode

When the base station is on, the radio 1 and radio 2 begin to work automatically.

(2) Setting up the type of data link

Shut off radio 2: long press the F key until red F indicator is on, that means radio 2 has been shut off. Also, data link one indicator goes off.

After the base station restarts, the radio 2 would be powered on

automatically.

Shutting off radio 1: power on/off the radio 1 on the base station setup interface of the FlyDance upper computer.

!!! Please keep the dual-link radio enabled unless otherwise specified by special laws or regulations.

1.4.3.6 Equipment charging

Connect the matching adapter or USB wire (adaptive portable charger, 12V output voltage recommended) to the LEMO port of the equipment, which has a maximum charging power of 30W, supports PD3.0 quick charge, and needs about four hours for charging.

1) Charging in power-off mode

The red indicator of power blinks during charging, and is on after the charging.

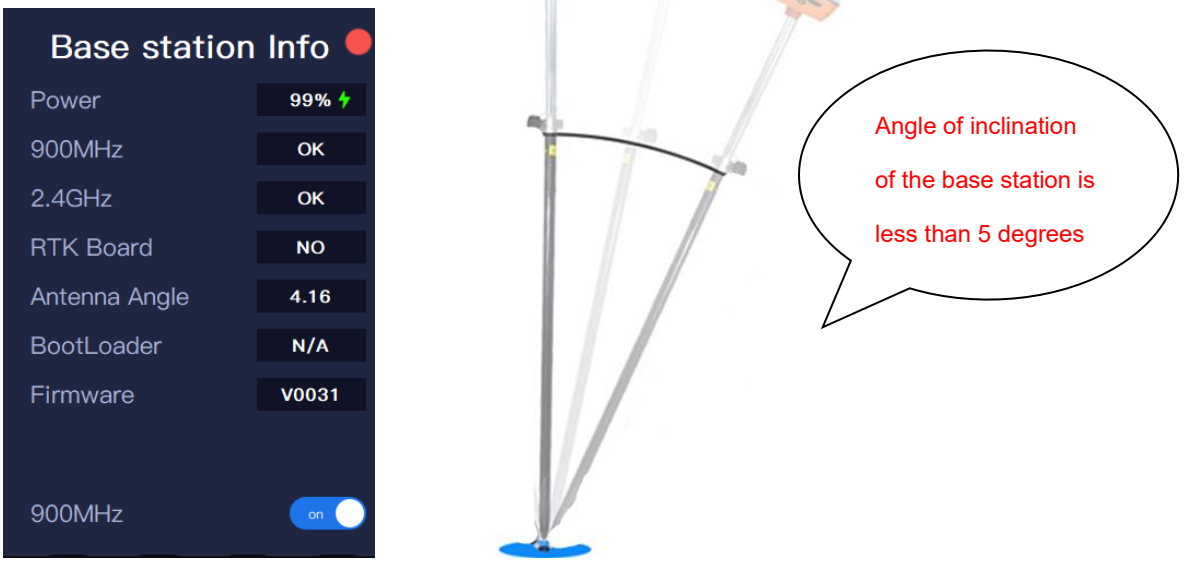
2) Charging in power-on mode

The yellow indicator of power blinks during charging, and is on after the charging. Corresponding ground FlyDance upper computer shows that the base station is being charged. It is showed as follows:

Note: for the safety and longevity of your product, please be sure to use the power adapter with a standard package to charge the battery inside the base station.

1.4.3.7 Function of inclination alert

The base station shall be usually put at a level and open place, far away from roads and vehicles. Be sure that the host computer inclines within 5 degrees and stays within 5cm accuracy. The FlyDance upper computer on the PC would display the angle of inclination. The equipment would give an prompt of extra large angle of inclination if such angle is greater than 5 degrees. At this time, the base station positioning cannot be ensured to remain within 5cm accuracy.



Note: for your product to play a better performance, please be sure to place the equipment at a level and open location, far away from roads and vehicles.

1.4.4 Environmental and Maintenance Requirements for Base Station

（1） The base station shall work from -10 to +50℃, and long-time exposure to high temperature shall be avoided.

（2） The base station shall be installed on a tripod at a level location. The tripod top must not be shook while the station is working.

（3） The station shall be put at an open place, free of any shelters, more than 10 meters away from the drone formation, and far away from telecommunication towers, roads and vehicles to avoid any interference produced from on-board systems.

（4） After being installed, the station cannot topple or be relocated at will.

（5） Do not use the station in inclement weather to avoid any damages caused by electric shocks or lightening. In case of rain and fog, high-precision positioning may be affected. If the upper cover of the base station is stained with rain, it should be wiped in time, otherwise the positioning may be affected

by the shielding effect of rain

（6） As highly integrated equipment, the station shall work in a condition where measures are taken against dust and moisture, and shall also be protected from any knocks leading to inside sensor damages.

（7） Please carefully install the antennas as needed to ensure proper tightness.

（8） Please use matching devices for power supply or battery charging, and any unauthorized modification and disassembly of the station are not allowed.

1.4.5 Storage and transportation requirements

(1) About product storage: Because the product has a built-in lithium battery, the long-term storage temperature is 20 ℃± 5 ℃, and it is charged and discharged every three months according to the requirements: charge it to 100%, rest for 10 minutes, and then start it to work and discharge to about 5% of the electricity (note that if you use GPS indoors, it will automatically shut down, and need to put it into the outdoor with GPS for discharge), and then charge it to 70% for storage after standing for 10 minutes.

(2) Humidity: (10-90)% RH (non-condensation).

(3) The Base station is a highly integrated device, please put the product in the package and take shock absorption measures. The battery power is about 50% for long-distance transportation.

1.4.6 Maintenance requirements ofbase station

(1) The connecting wire is normally coiled and shall not be bent and broken.

(2) The antenna shall be packed well and shall not be broken by stress.

(3) Attention shall be paid to dust and water prevention at each connecting port, and it shall be cleaned with high-pressure air gun when necessary according to the situation.

(4) Please use the supporting special power bank to supply power. It is not allowed to modify and disassemble the base station without permission.

(5) In case that it is used in light rain, waterproof measures shall be taken to avoid water inflowing into the product. After use, measures must be taken to dry it to avoid damage to the base station due to inflowing water or damp.

(6) When cleaning the base station and antenna, the power supply shall be

removed, and they shall not be wiped with liquid.

1.5 Communication Control Equipment

The supporting communication control equipment of the product includes Network controller, Switch, AP and network cable.

The following is the product icon:

Network Controller

AP

Switch

GCS Switch (Xbee radio)

Remote control receiver

1.5.1 Environmental and Maintenance Requirements for Communication Control Equipment

Controller:

(1) Input voltage: (100-240) V

(2) Temperature: -10~+55℃

(3) Humidity: (10-90)% RH (non-condensation)

GCS Switch:

(1) Input voltage: 5V 2A

(2) Temperature: - 10~+55 ℃;

(3) Humidity: (10-90)% RH non-condensing;

AP:

(1) AP is powered by POE without external equipment, with attention paid to moisture and dust prevention when using AP.

(2) Working temperature of AP: -10~+50 ℃, storage temperature: -30~+60℃.

(3) The network cable shall be pulled out when cleaning AP, and it shall not be wiped with wet fabric or liquid.

Switch:

(1) The power supply is located on the right side of the rear panel, and the access power supply shall be (100-240) V~50/60HZ 2A AC power supply.

(2) The power supply shall be kept off before use, and it is necessary to

wear anti-static wrist to avoid potential safety hazards.

(3) In order to avoid the danger of electric shock, it is not allowed to open the shell when the switch is working, even when the power is off.

(4) When cleaning the switch, the plug of the switch shall be pulled out, and shall not be wiped with wet fabric or liquid.

(5) Switch working temperature: -10~+50℃, relative humidity: (10-90)% RH (non-condensation), daily storage temperature: -30~+60 ℃ , relative humidity: (10-90)% RH (non-condensation).

(6) It is necessary to pay attention to dust prevention. Dust will cause electrostatic adsorption on the surface of the switch, leading to poor contact of metal contacts. In order to avoid electrostatic affecting the use of equipment, it is necessary to remove dust of the equipment regularly, keep air circulation, confirm that the equipment is well grounded, and ensure smooth transfer of electrostatic.

(7) Attention shall be paid to electromagnetic interference keeping away from high-frequency, high-power and high-current equipment, and to lightning protection.

※Communication control equipment shall be avoided in the environment with high temperature of 40℃ or above on the ground and in exposure to the sun.

1.5.2 Storage and transportation requirements

(1) Temperature: -30℃~+60℃

(2) Humidity: (10-90)% RH (non-condensation)

(3) Pay attention to dust and moisture prevention.

(4) Pack it in a box with shock absorption function to ensure that it is in good condition after transportation.

1.5.3 Maintenance requirements

(1) It is necessary to disconnect the power supply after each use, unplug the network cable, and handle the equipment with care.

(2) It is necessary to keep the product clean, especially ensure that there is no foreign matter in the connection interface of each piece of equipment (including the network cable interface), it is not stuck or there is no dust in it.

(3) If unreliable interface connection is found, an air gun or a vacuum cleaner can be used to clean the dust of each interface.

(4) It is not allowed to open the product shell for maintenance or repair without permission. Please contact the manufacturer for solution in case of any problem.

To ensure the long-term stable operation of the system, it is necessary to ensure that there are good grounding measures, dust-proof measures and waterproof measures for power supply. It is necessary to keep the open air and the stable temperature in the use environment.

2.Installation Guide for Wifi Formation

ServerBasic computer configuration:

1. Win7 or Win10 system（WIN 11 system is not supported temporarily）
2. 5G wifi or RJ45 network interface
3. Remaining memory: ≥4G
4. Remaining memory on disc C: 20G; another disc with 30G for installation of the virtual machine

2.1.Virtual machine and server installation

2.1.1Installation of virtual machine:

Step 1: Install the virtual machine.

(Edition: VMware-workstation-full-14.1.2-8497320.exe)

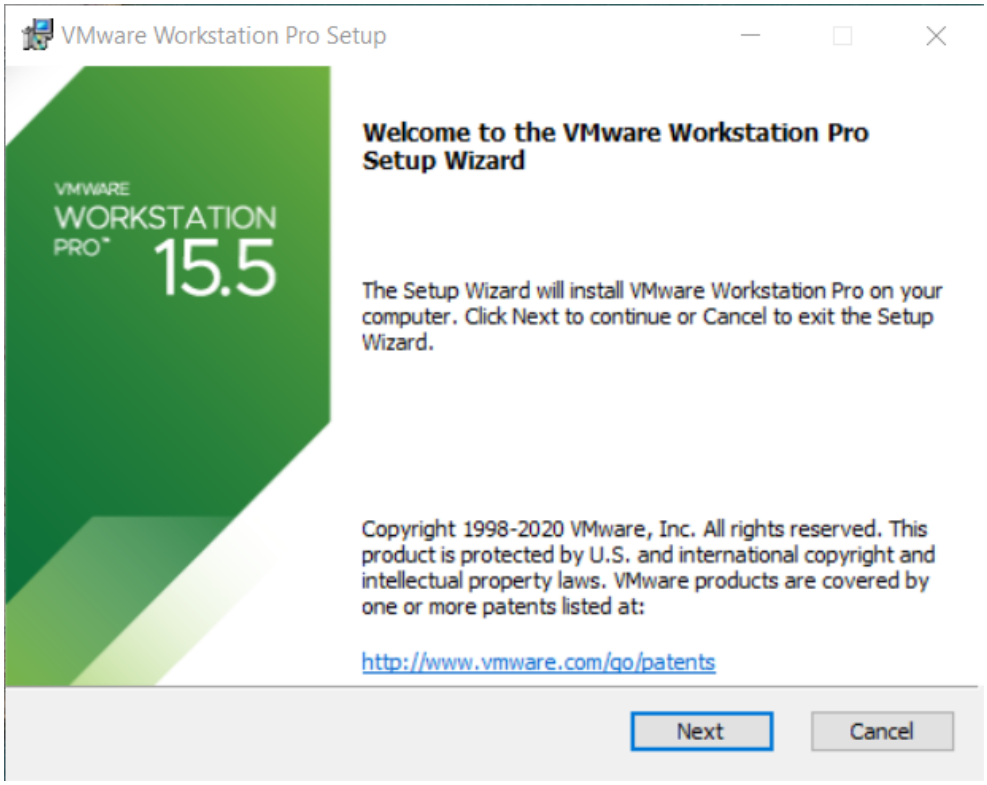
Virtual machine 14.1.2 download link:

https://www.fixdown.com/soft/950.html

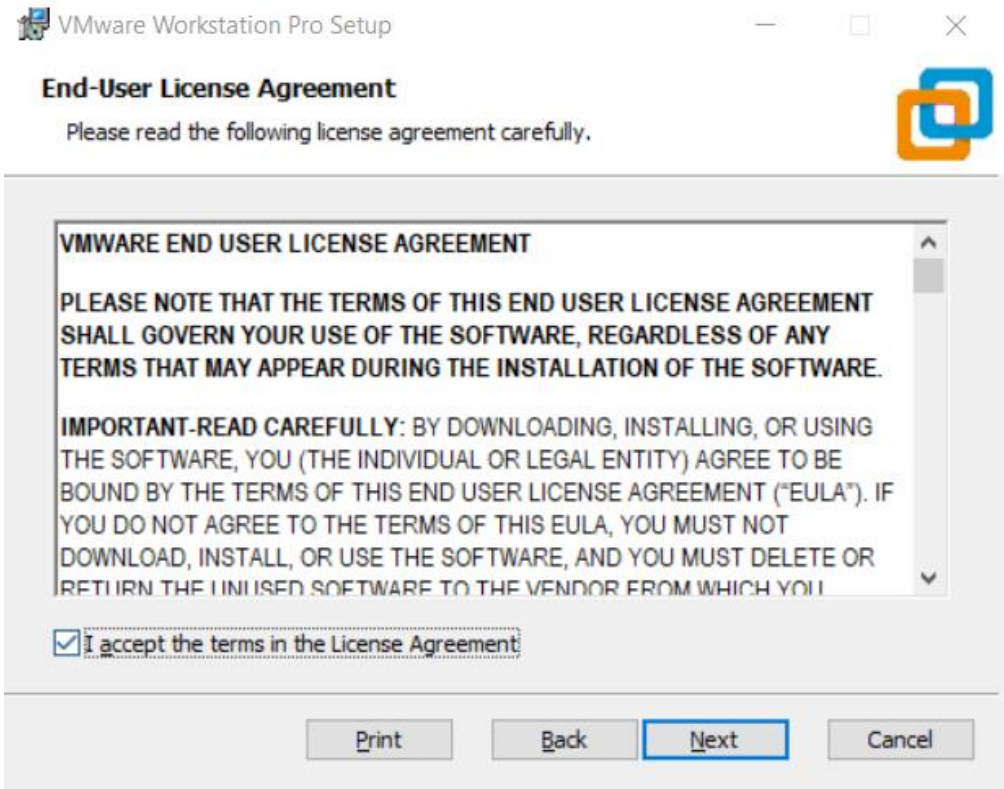
Virtual machine 15.5.7 download link:

https://download.zol.com.cn/tuiguang/detail/4/37058.shtml

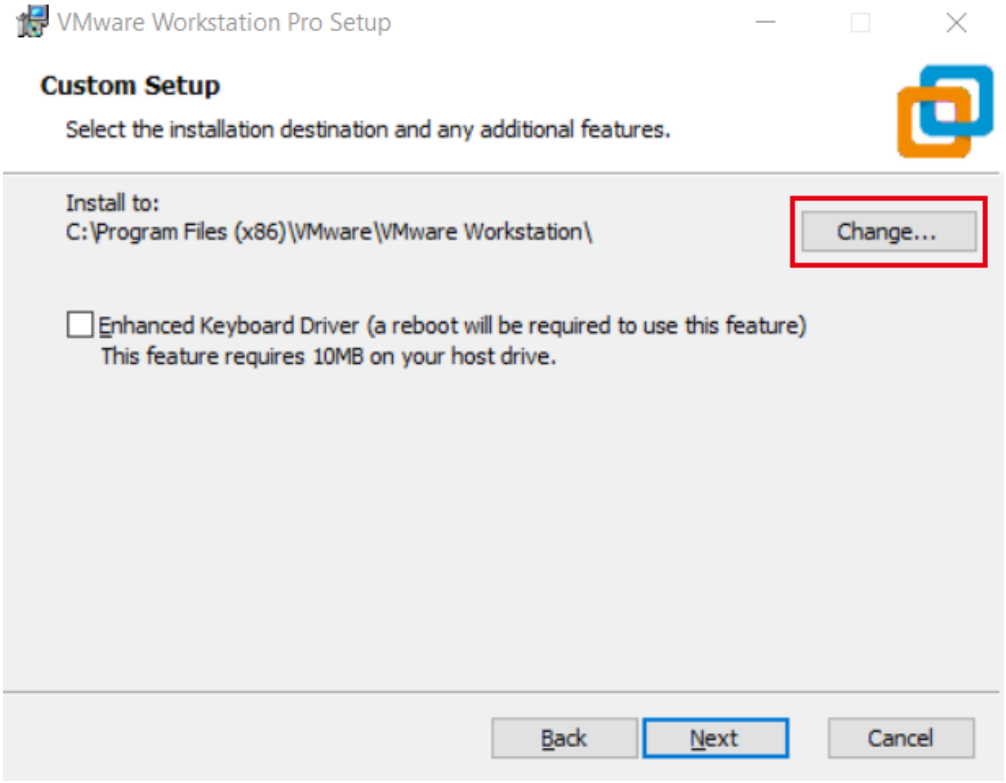
Ubuntu download 20.04.1: https://cn.ubuntu.com/download



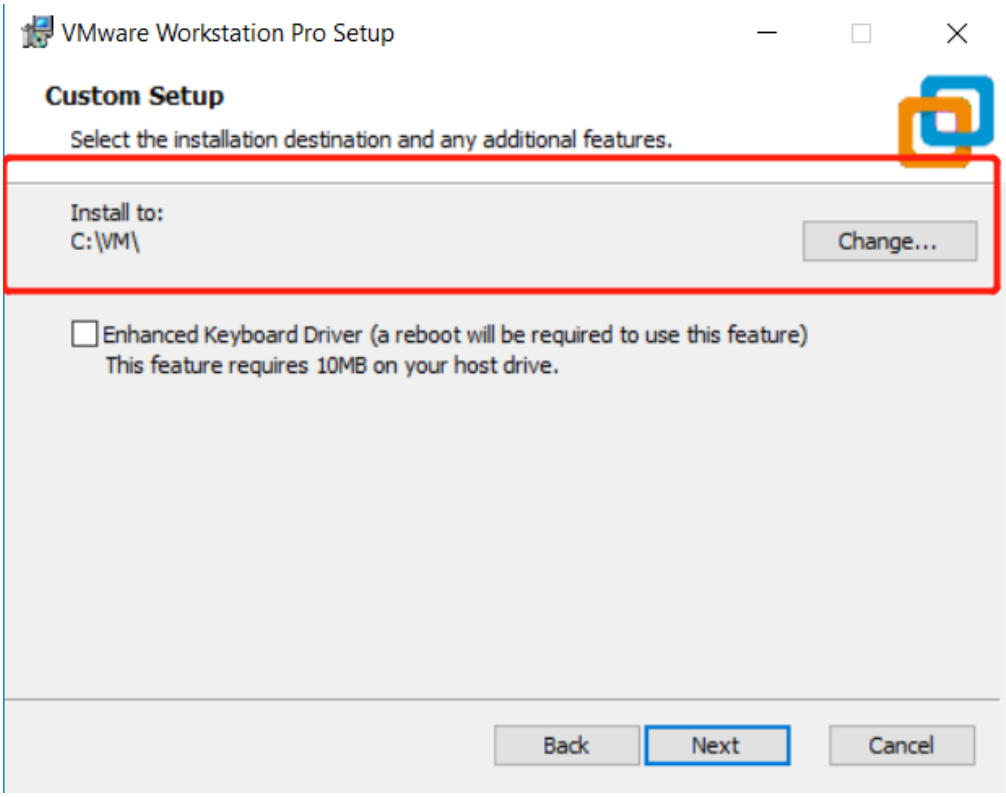
Click “Next”.

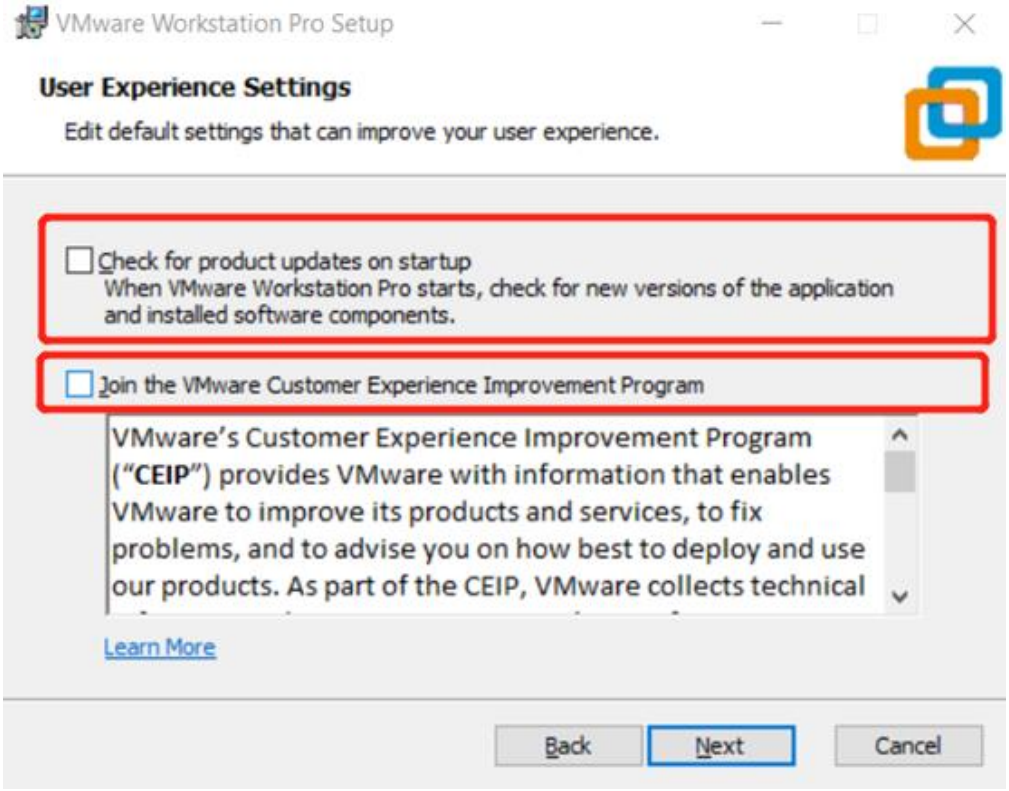


Check the box in front of “I accept the terms in Licensing Agreement ” and then click “Next”.

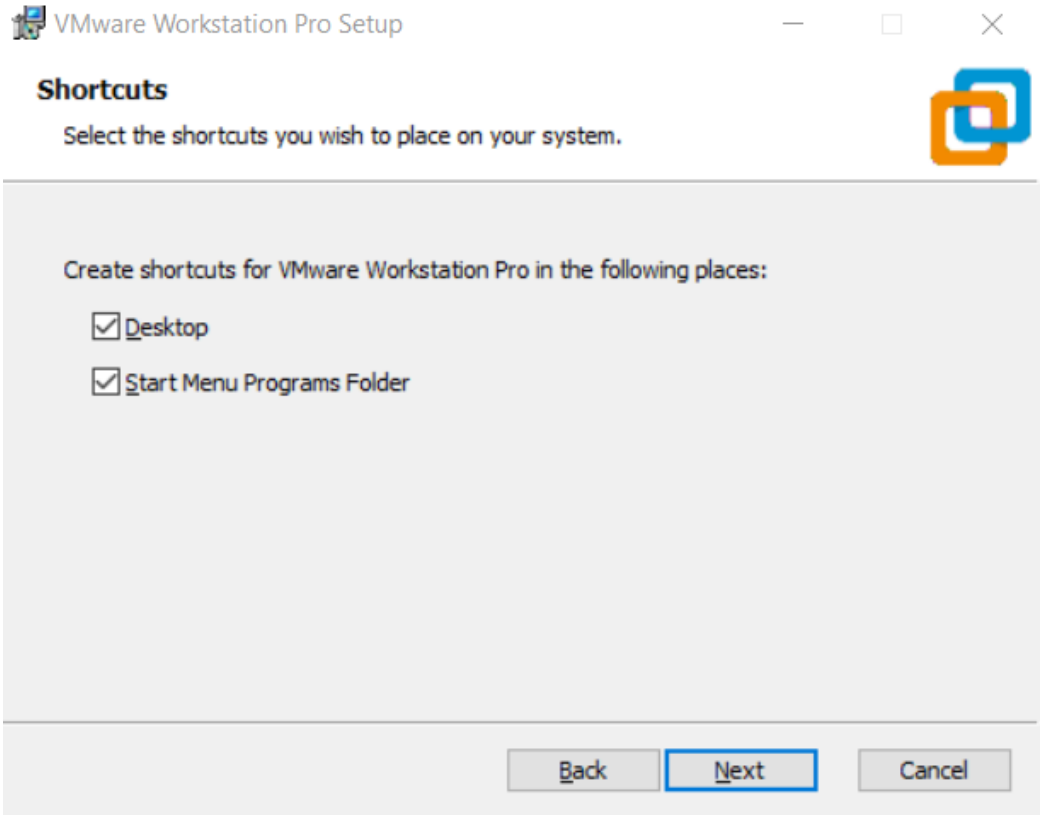


Change the installation location according to the current disc memory data, or click “Next” directly.

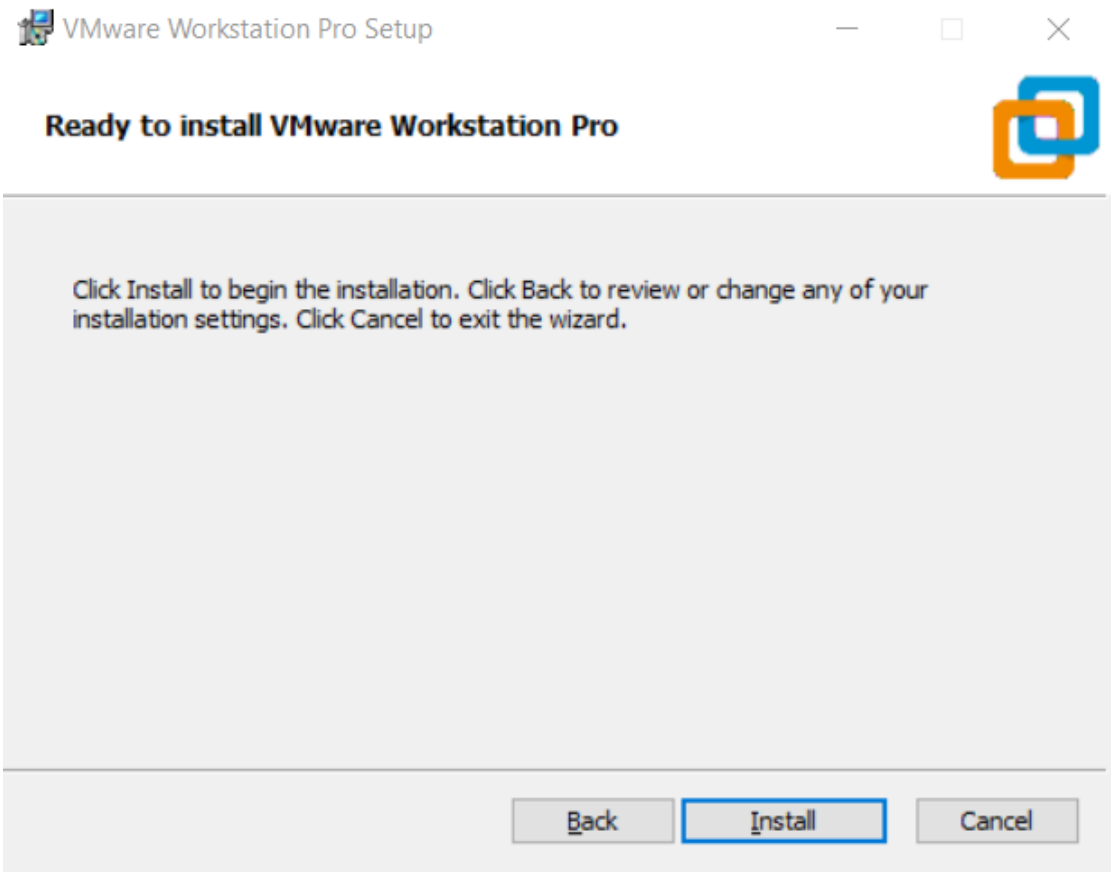




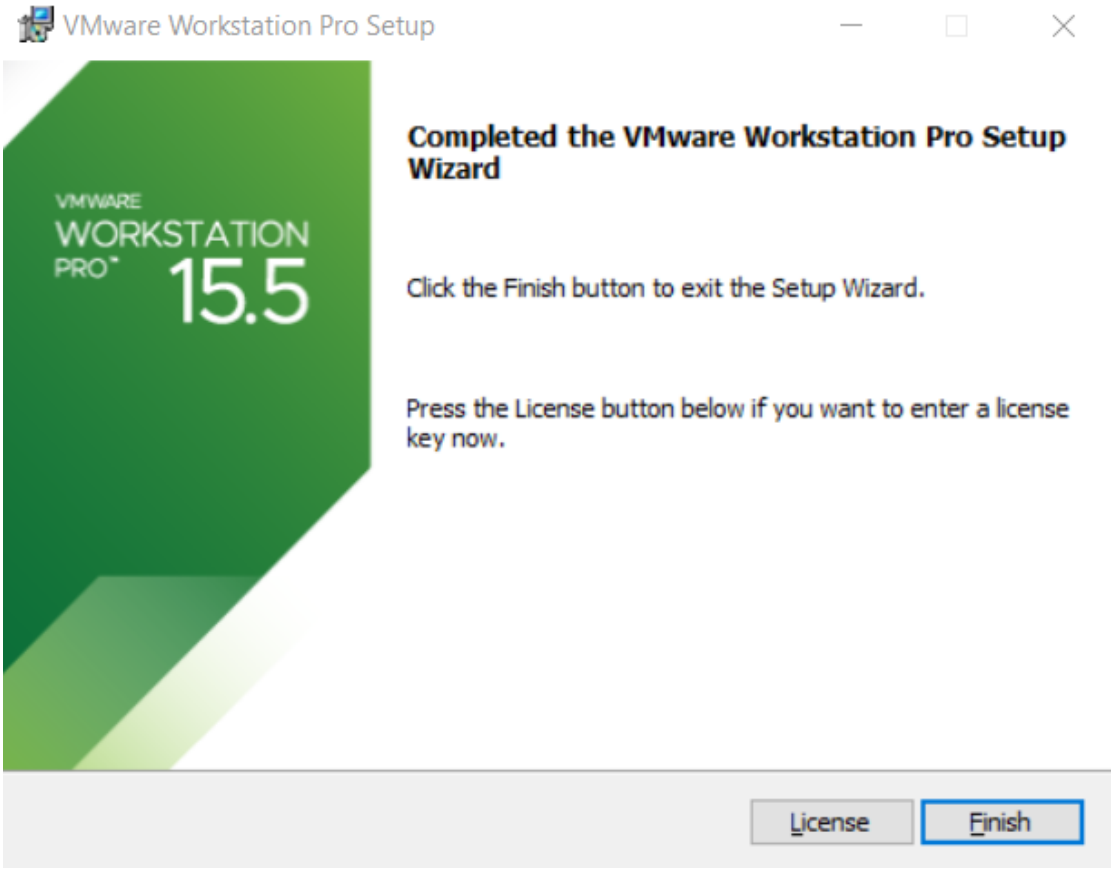
Check the box in front of "Join the VMware customer experience improvement program" and then click "Next".



Click "Next".



Click “Install”.

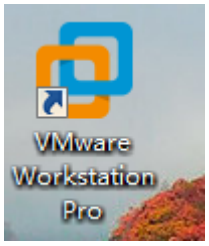


Enter the license key: FG78K-0UZ15-085TQ-TZQXV-XV0CD

Click “Finish”. (The system will enter installation of the virtual machine automatically.)

Step 2: Enter the license key.

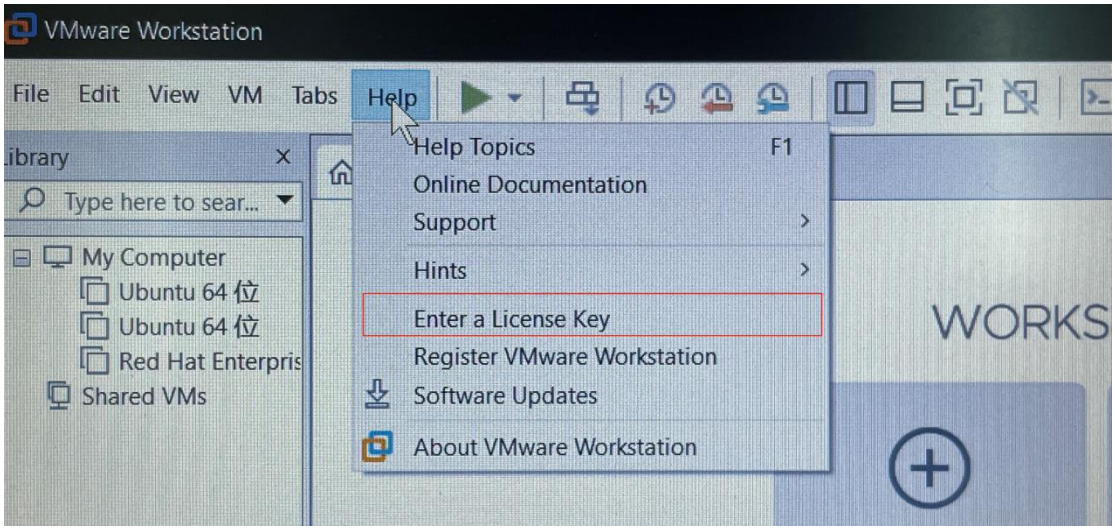
Start the virtual machine through the shortcut iron on the desktop.



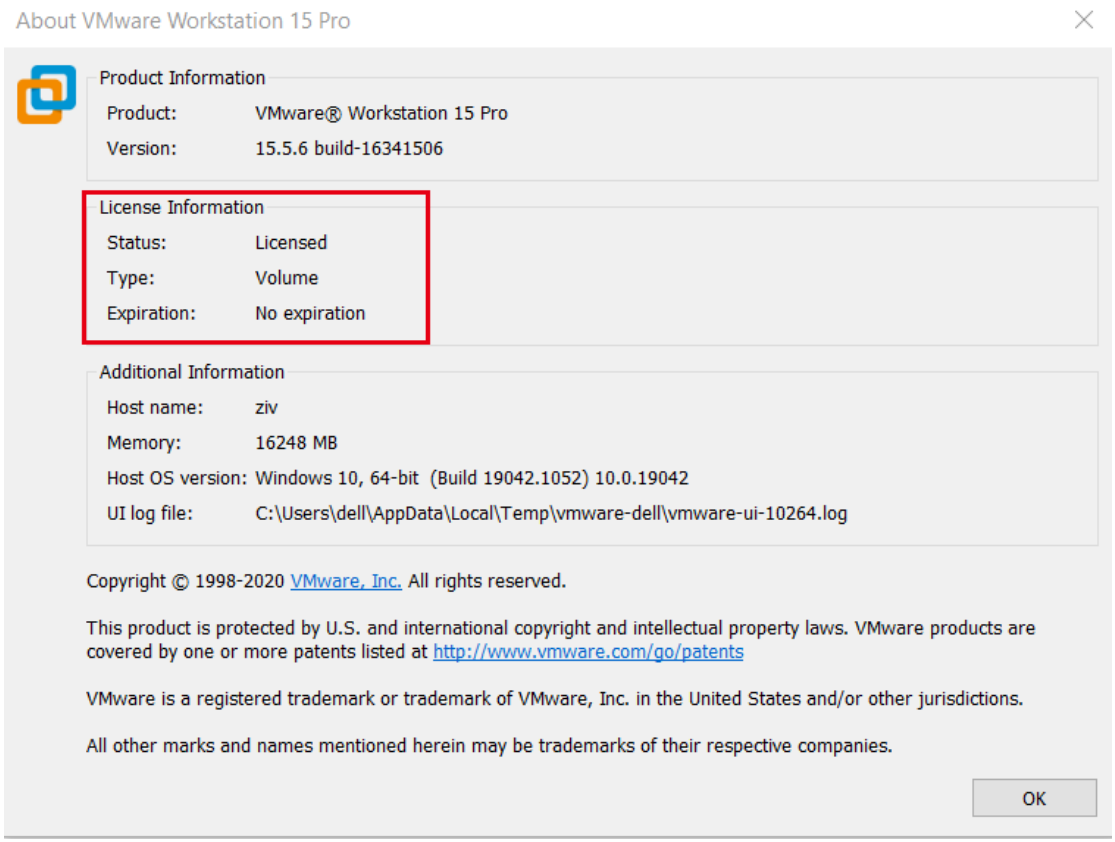
License 14.1.2: FF31K-AHZD1-H8ETZ-8WWEZ-WUUVA

License 15.5.7: FG78K-0UZ15-085TQ-TZQXV-XV0CD

Enter the license: Do it during start of the virtual machine, or after clicking “Enter license key” as in the figure below.



View software license expiration date.

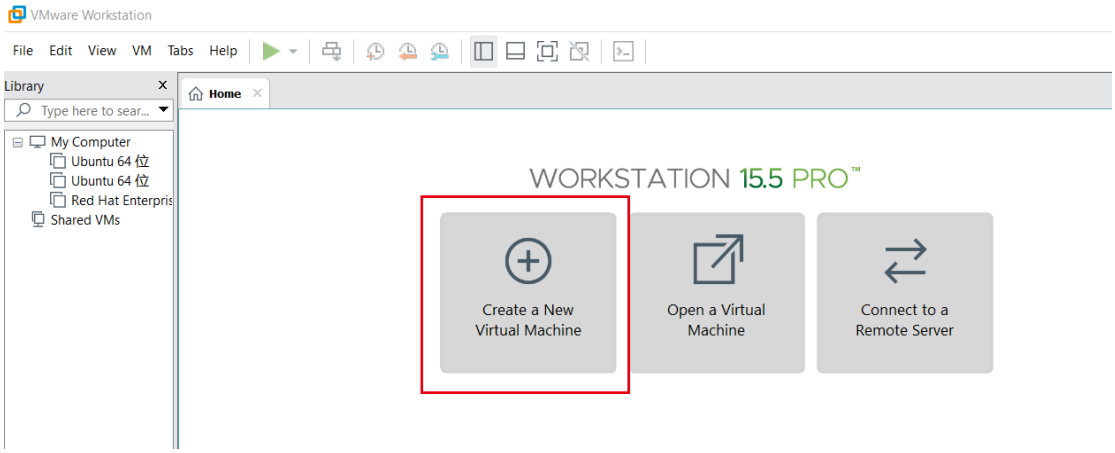


Step 3: Install the Linux system.

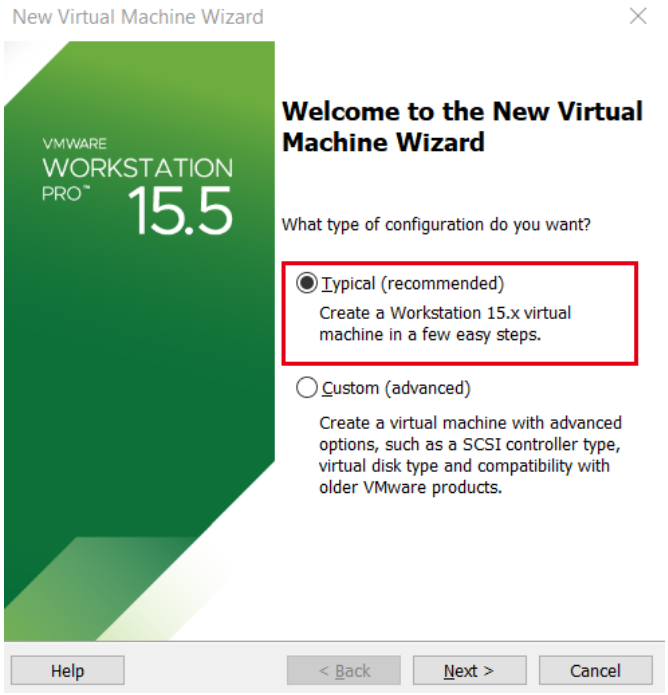
User name: hgfly;

Password: hgfly

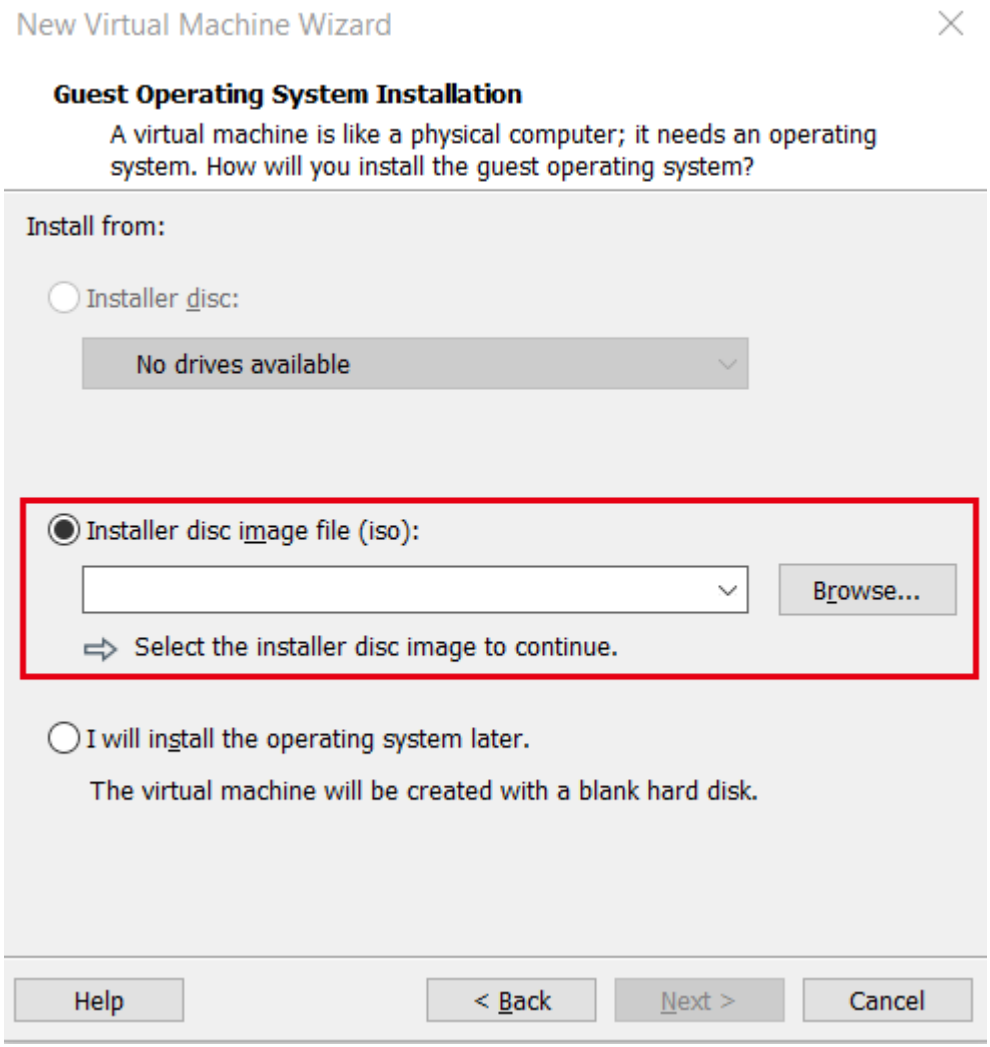
(Edition: ubuntu-18.04.1-desktop-amd64.iso)



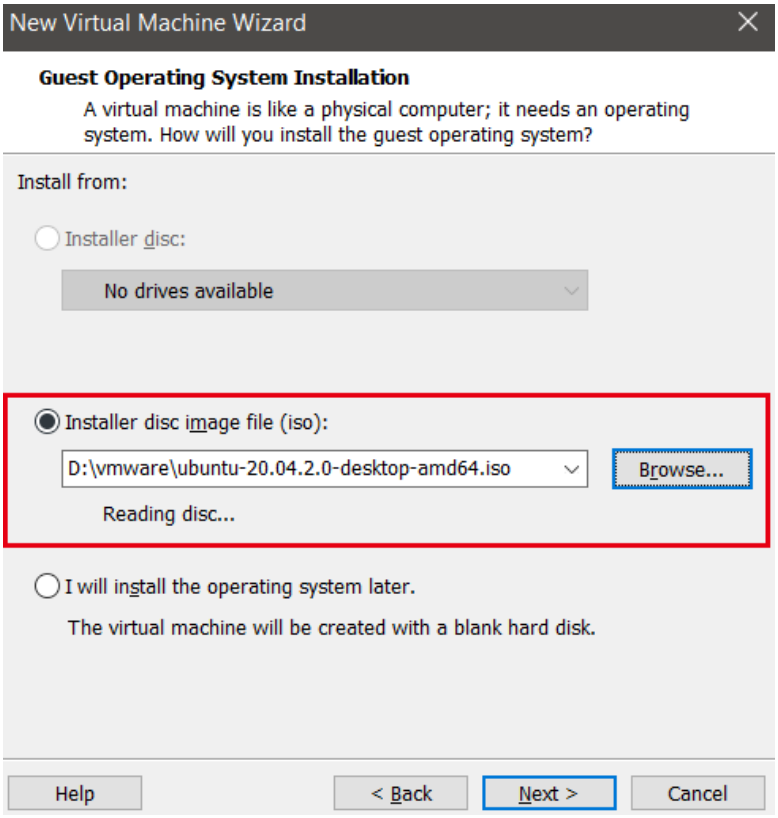
Click “Create a new virtual machine”.



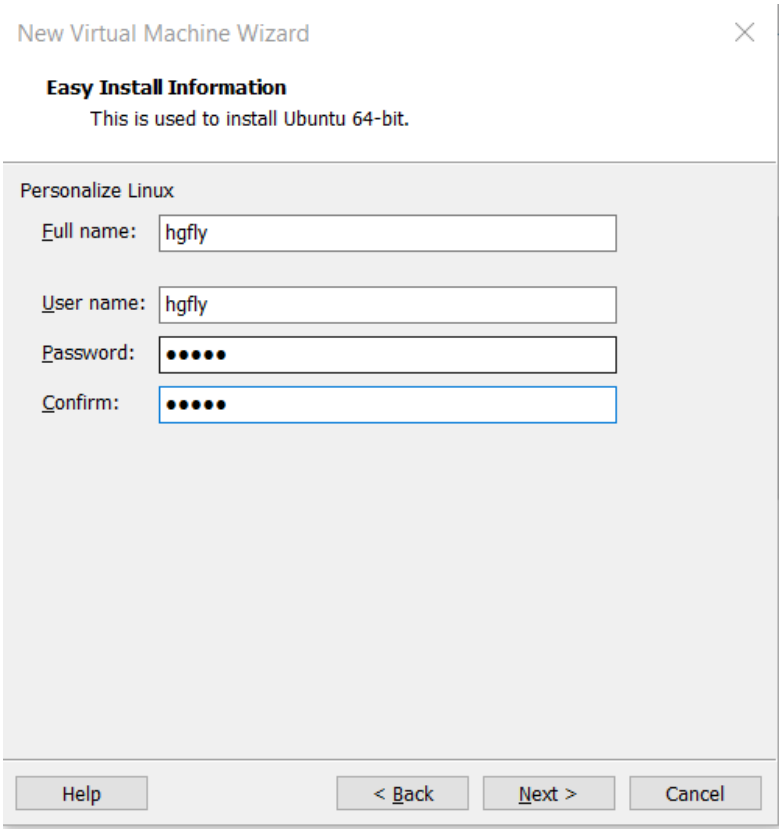
Choose “Typical (recommended)” and then click “Next”.



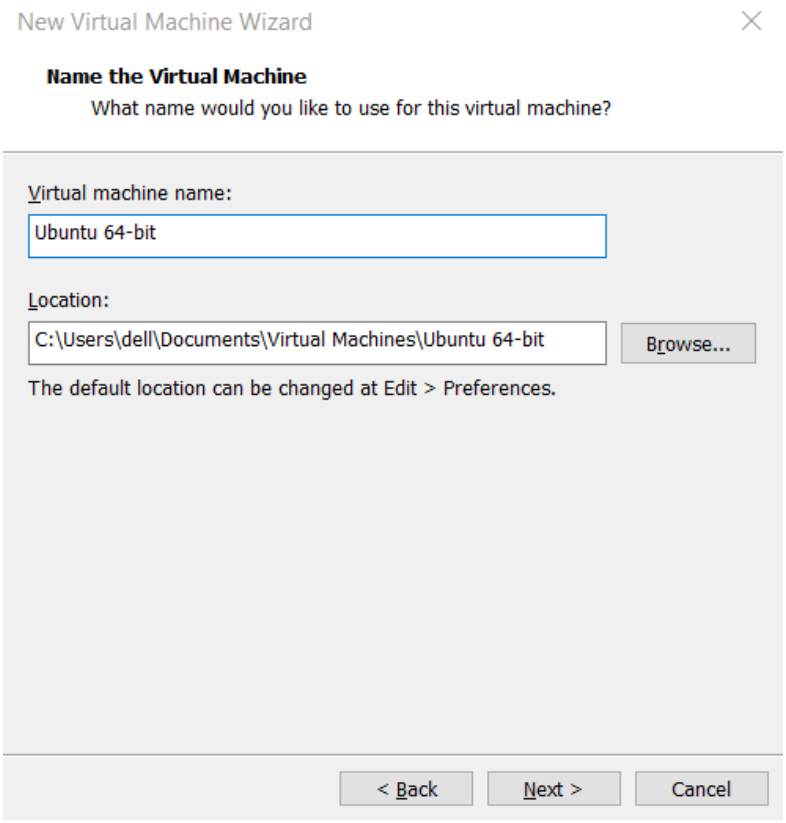
Create folder named “vmware” on disc C or D, save the Linux system installation file, check the box in front of “Installer disc image file (iso)” and click “Browse” to select.



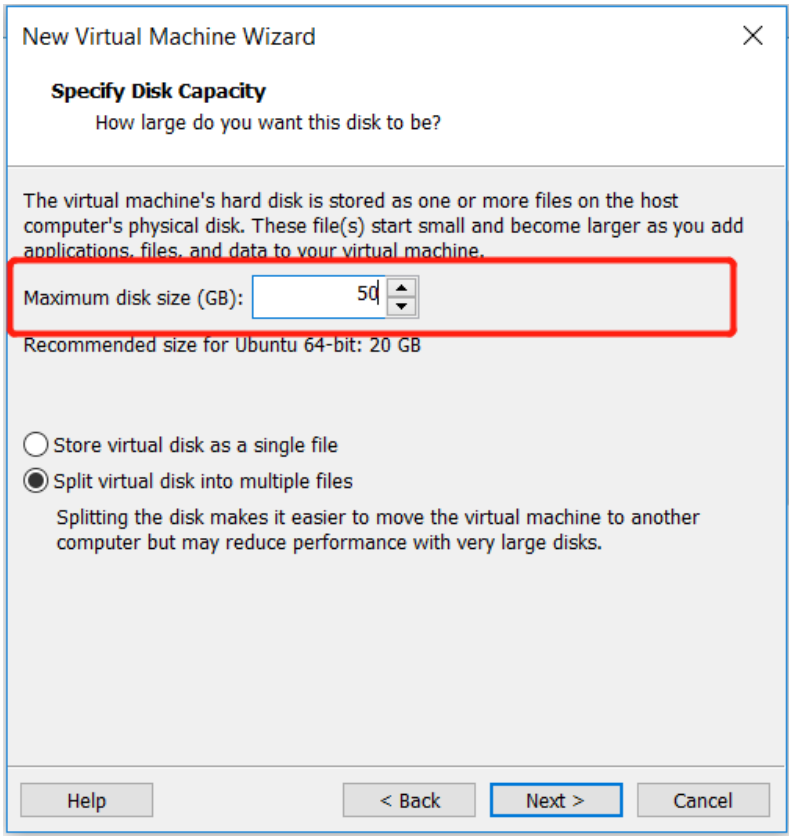
Click “Next”.



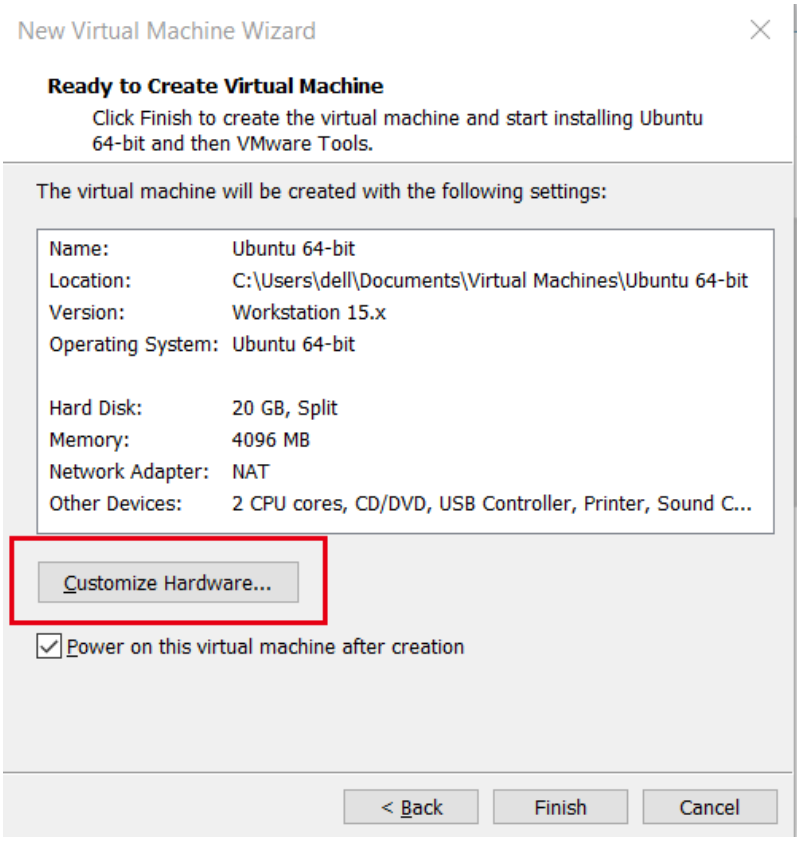
Enter “hgfly” in each box and click “Next”.



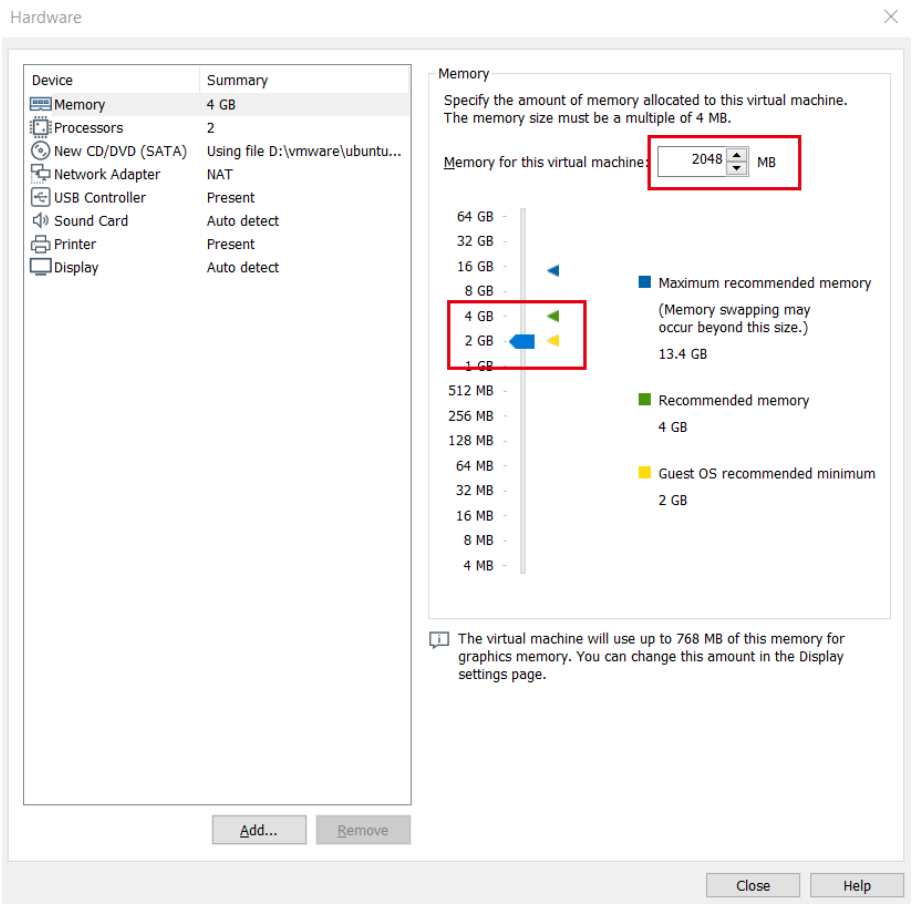
Click “Next”.



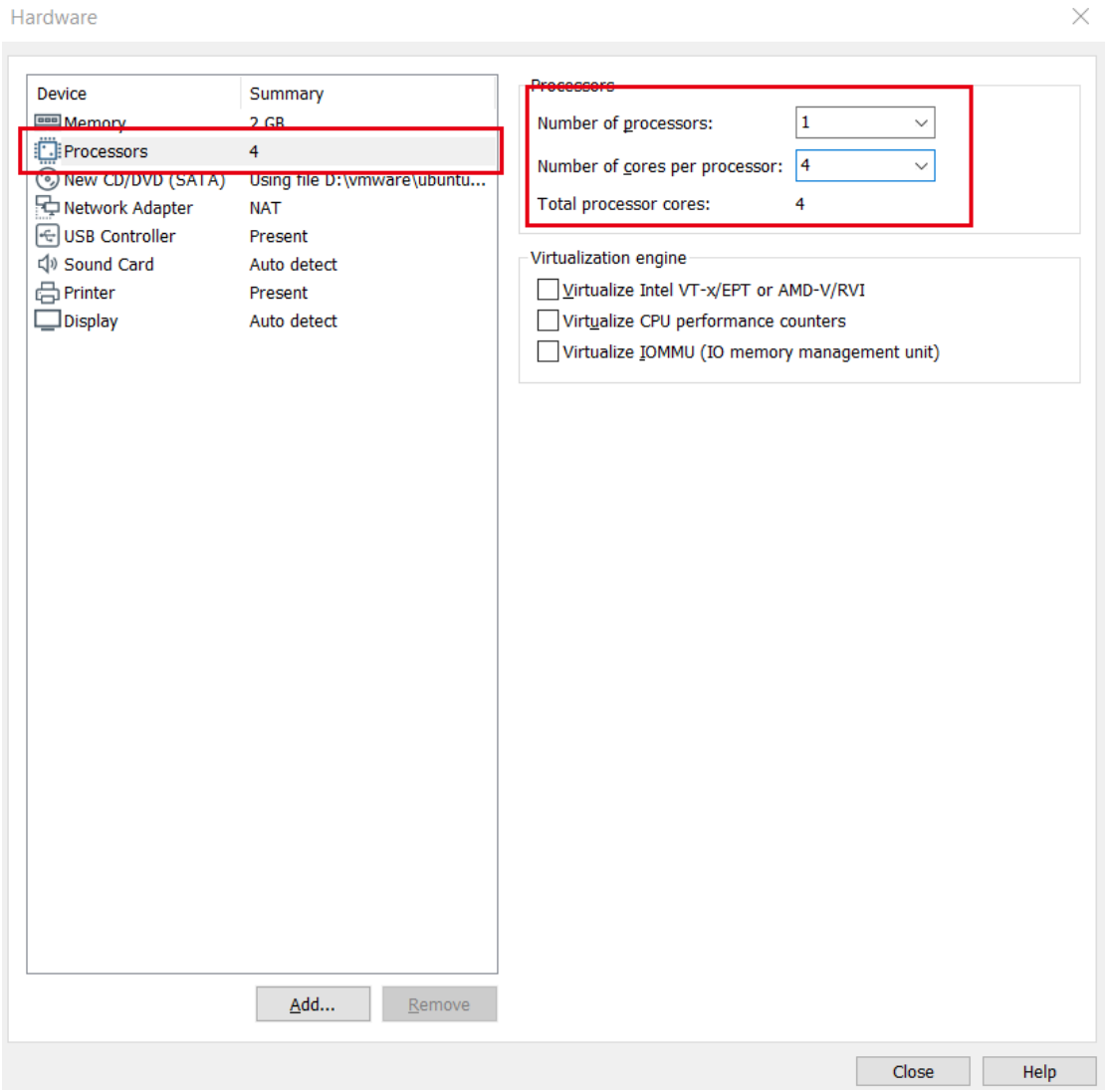
Modify the disk space to 50, click Next



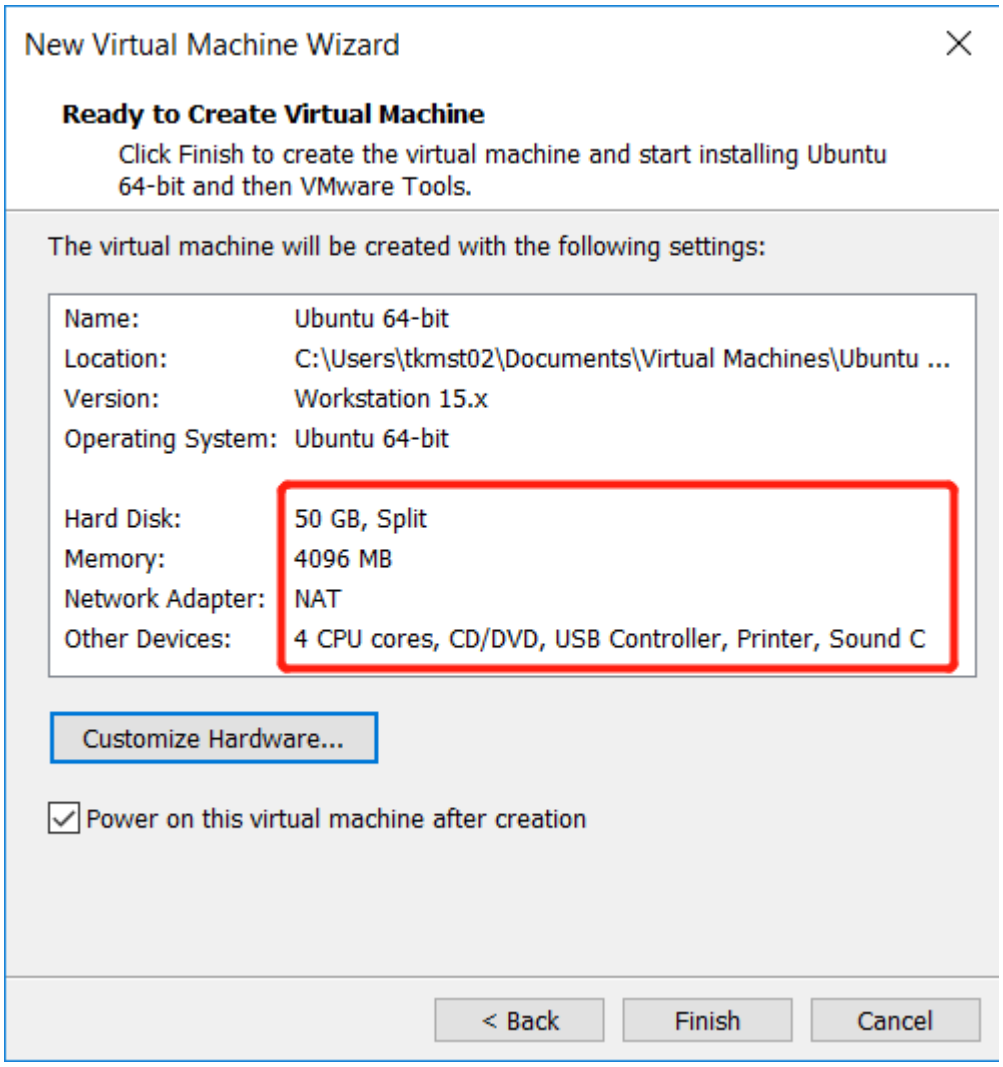
Click “Customize hardware ”.



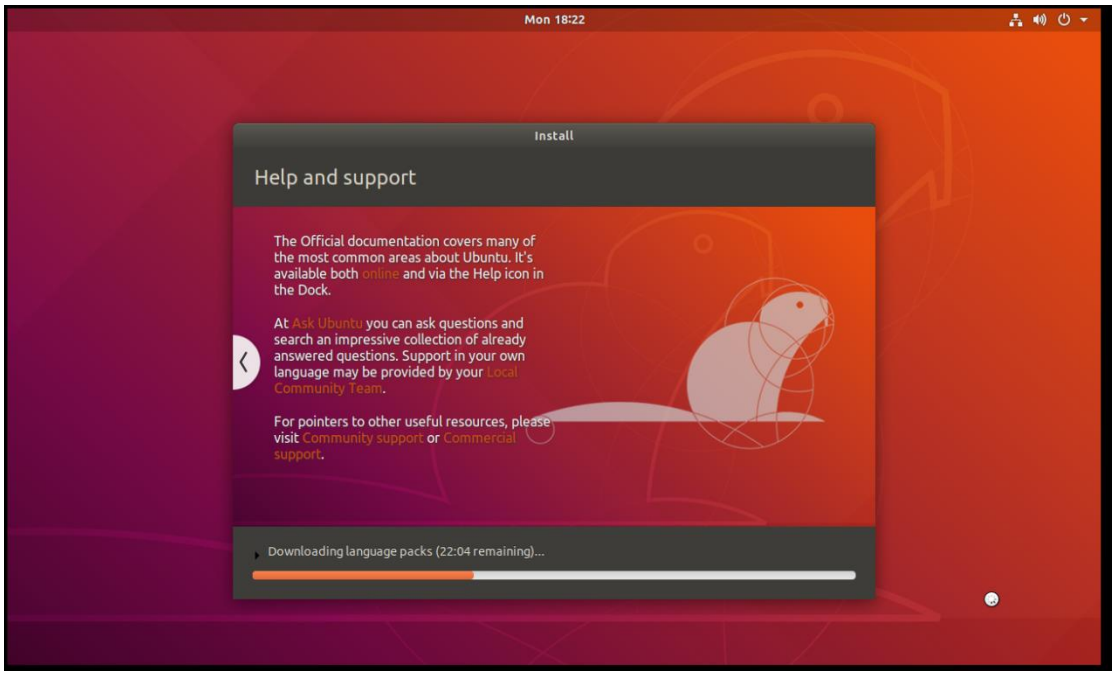
According to the configuration of the computer, adjust the memory to at least 2G, the maximum is 4G, not more than 4G (server configuration with 6000 drones require 500M)



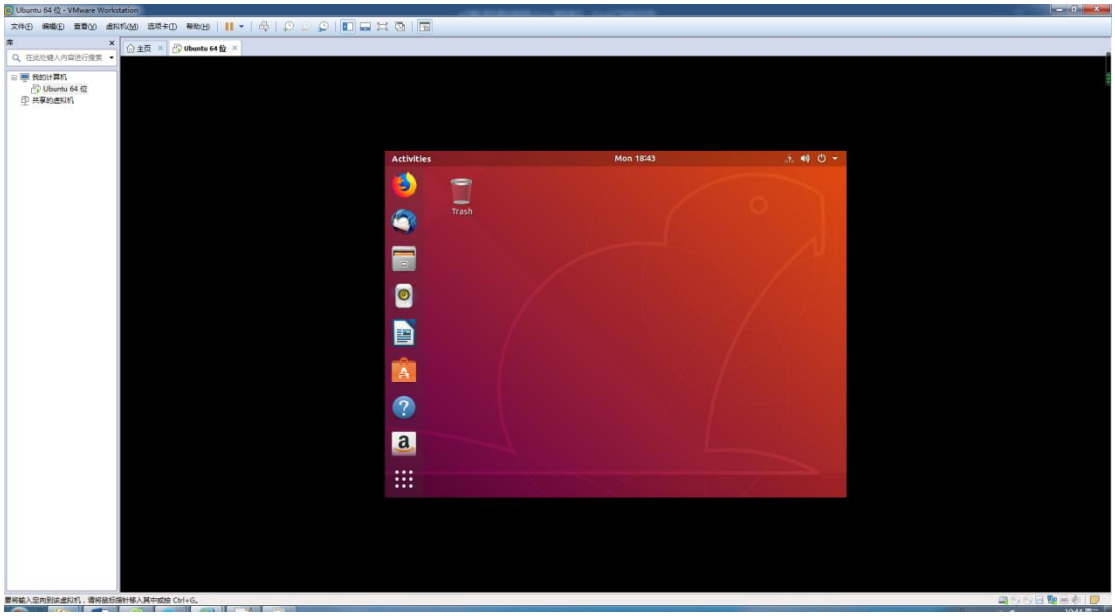
Click “Processors”, set the quantity as “1” and make the core quantity less than the **current actual computer** core quantity and click “Close”.



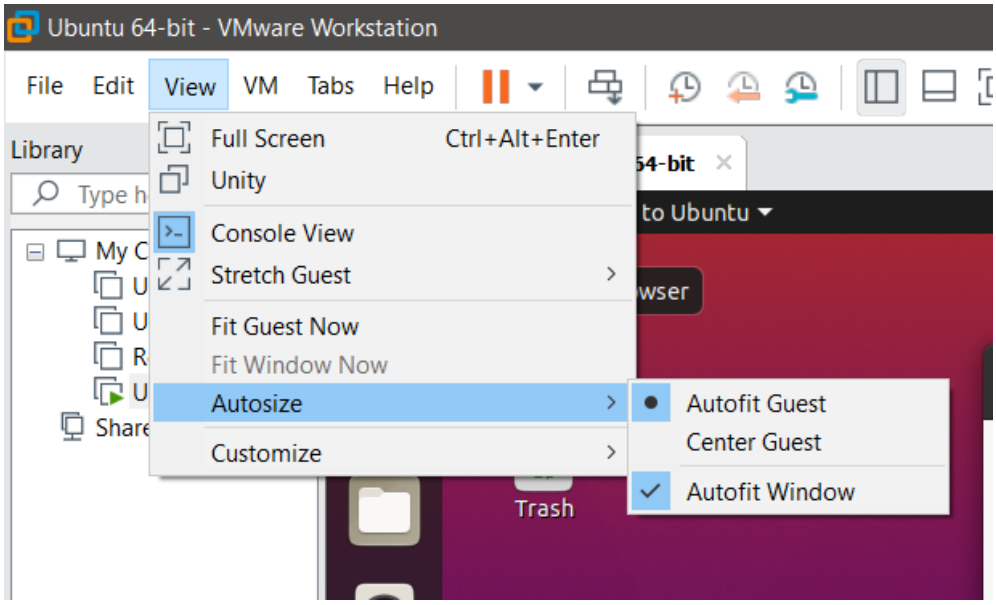
Check content in the red box to make sure that the hard disk is “50 GB,Split”, that the memory is “2048 MB or 4096MB” and that the number of CPU core is “4 or 8” and click “Finish”. (The system will execute Linux system installation automatically.)



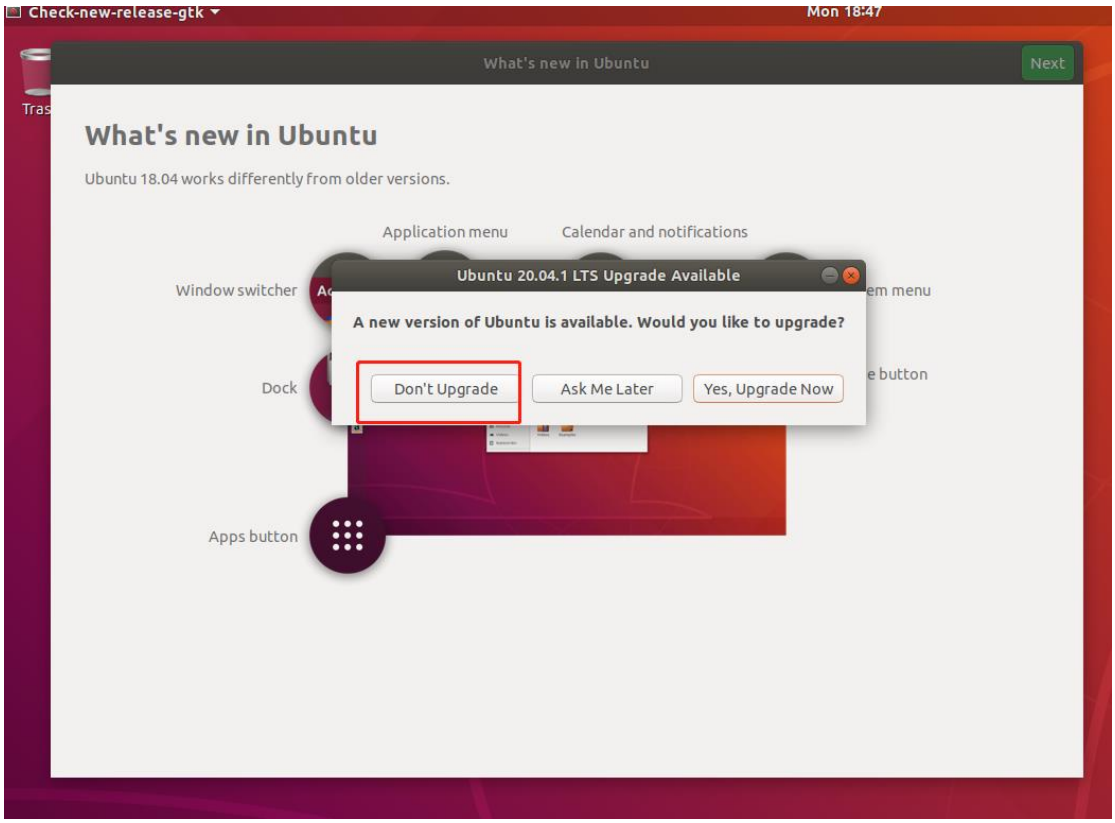
After installation, click the user and enter the password (hgfly) to sign in.



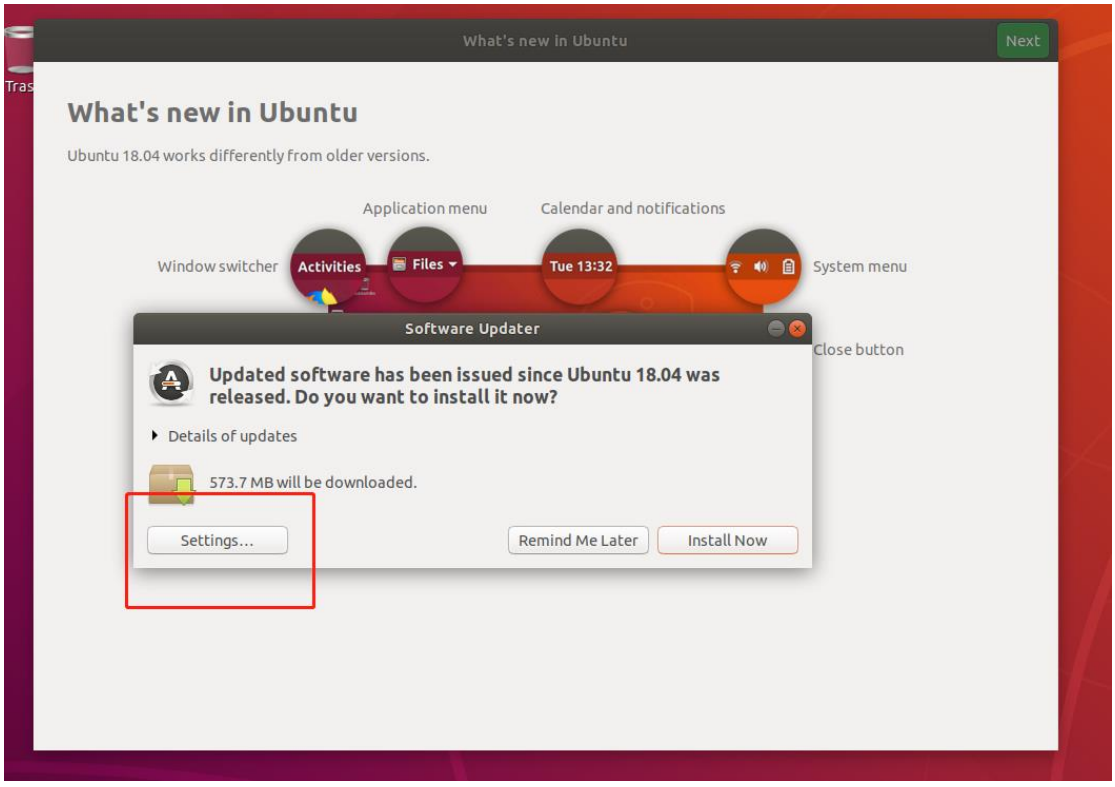
The display screen as in the figure above is too small and needs to be adjusted.



Click “Autofit Window” for automatic size calibrate.

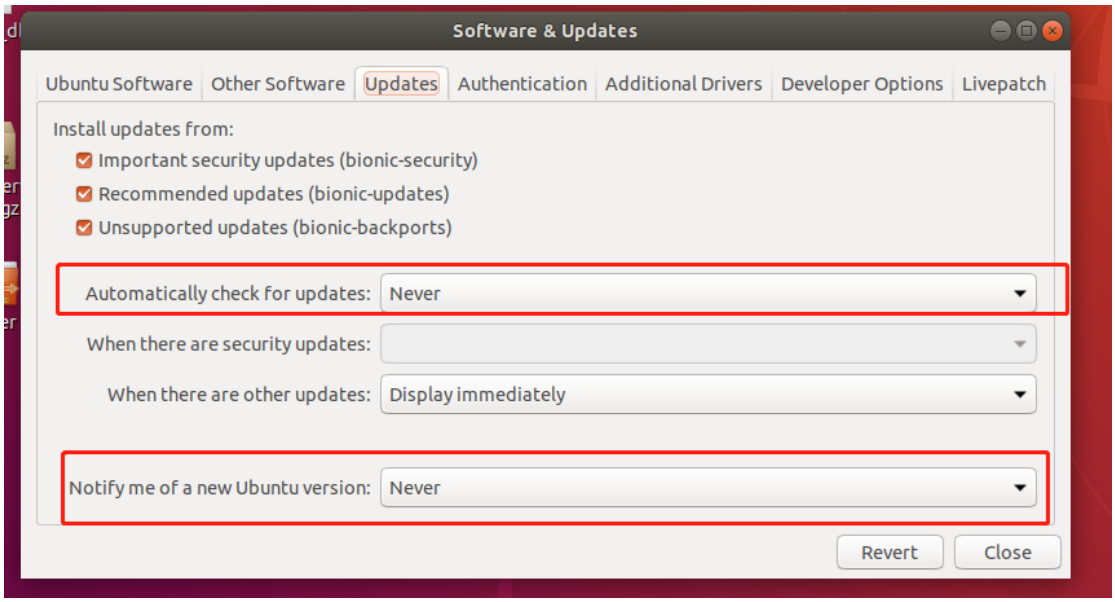


There will be a prompt about upgrading to 20.04.1. Click “Don’t Upgrade” and “OK” in sequence.

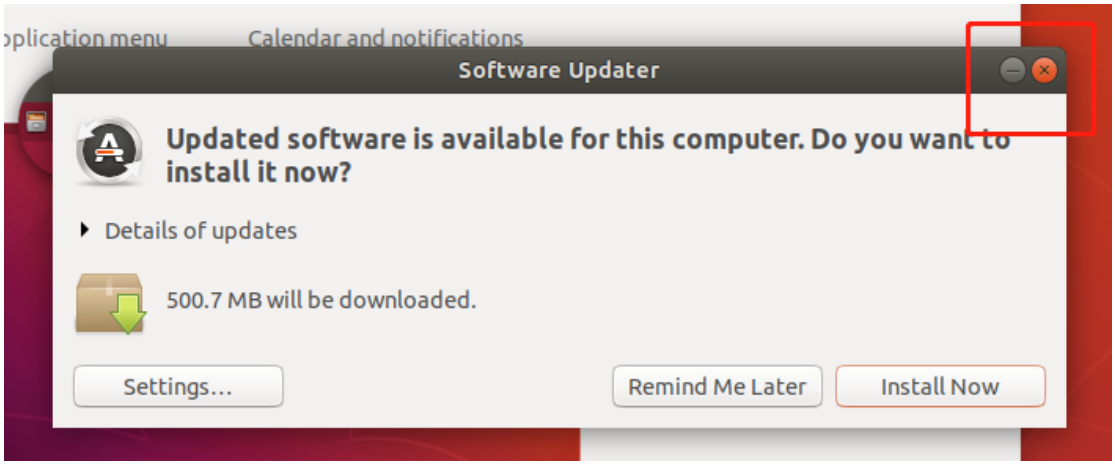


Click “Settings...” or open the setup page in “software&update” under the “Start”

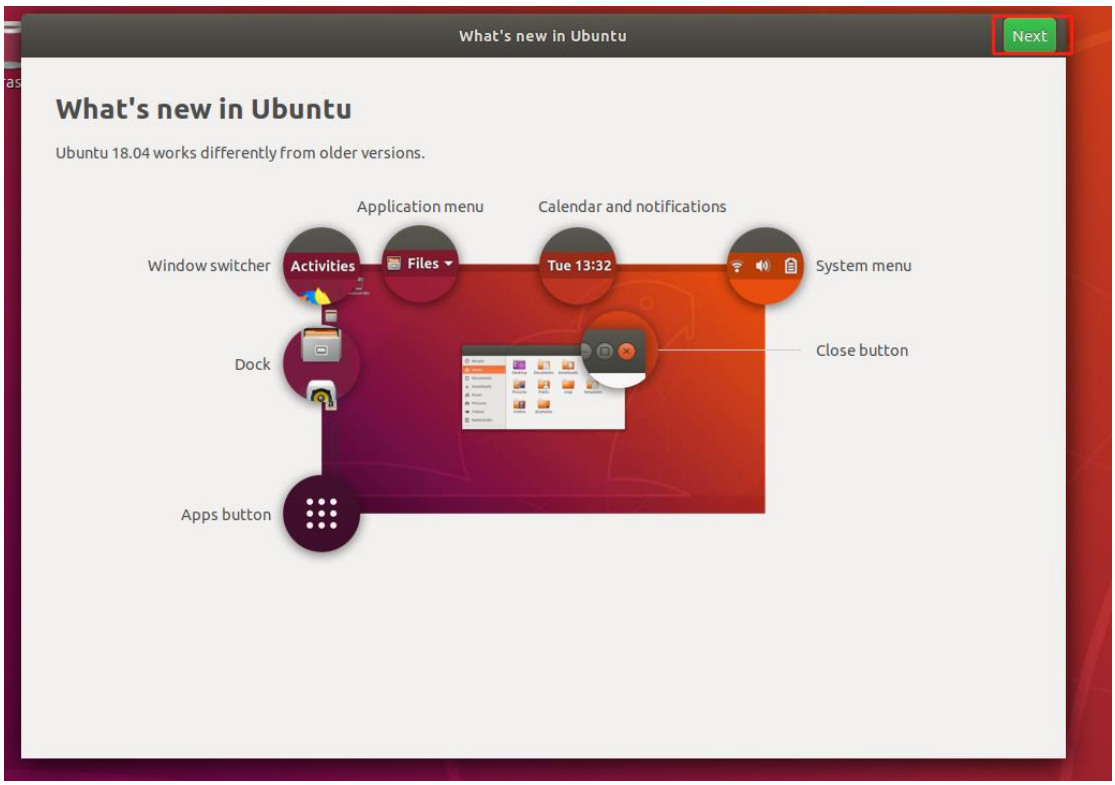
menu of the Linux system.



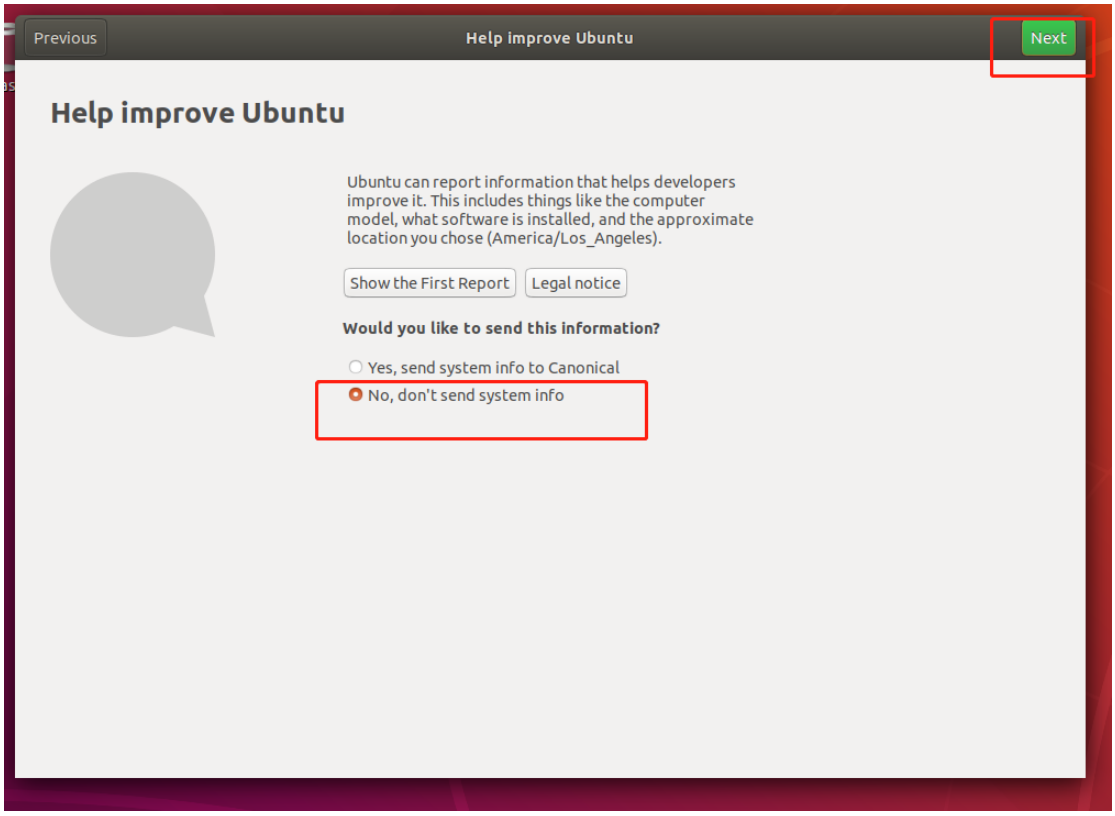
Choose “Never” in the both red box, enter the password (hgfly) and click “Close”.



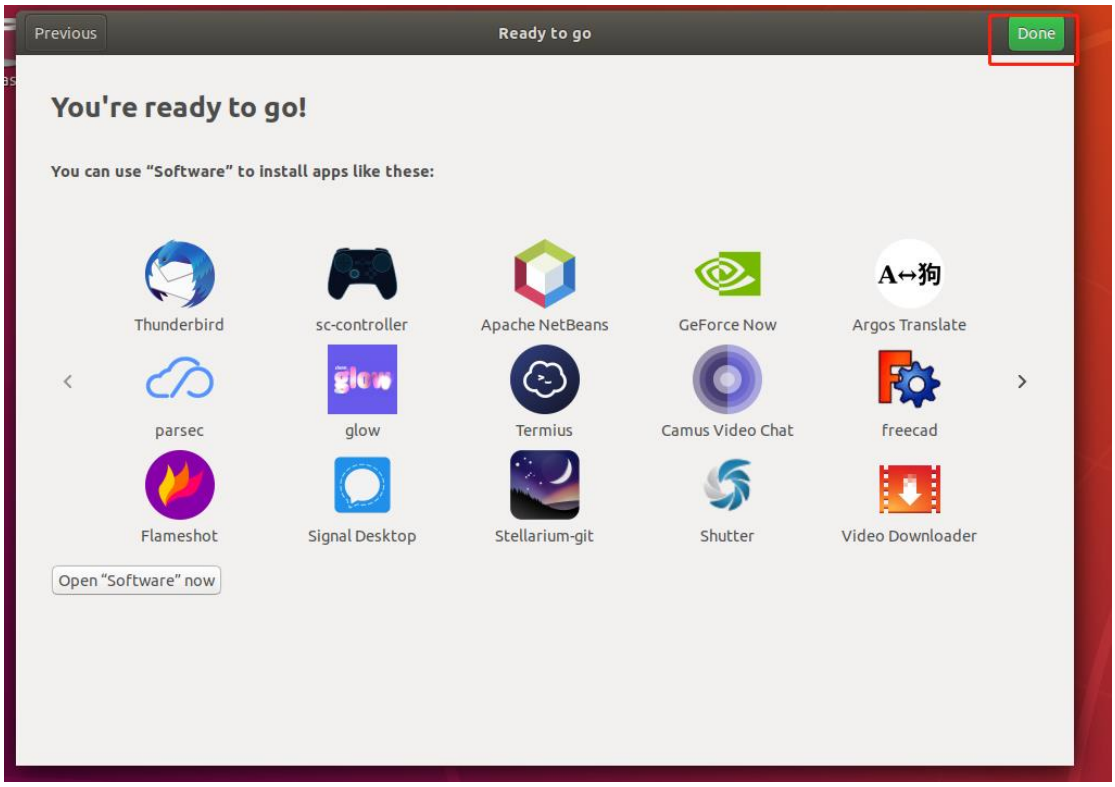
Click the close button at the upper right corner.



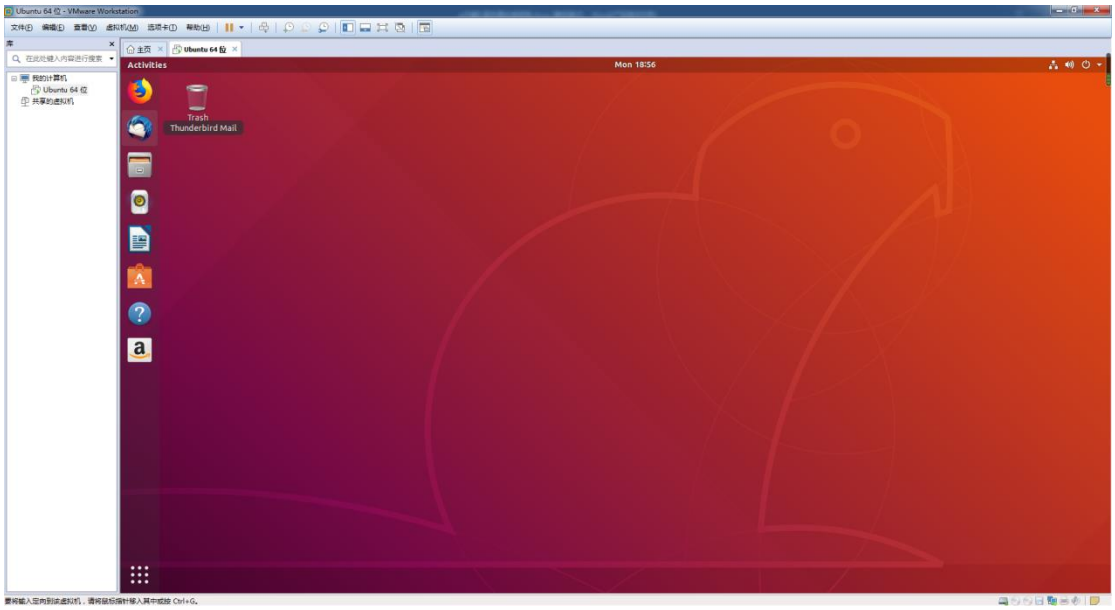
Click “Next”.



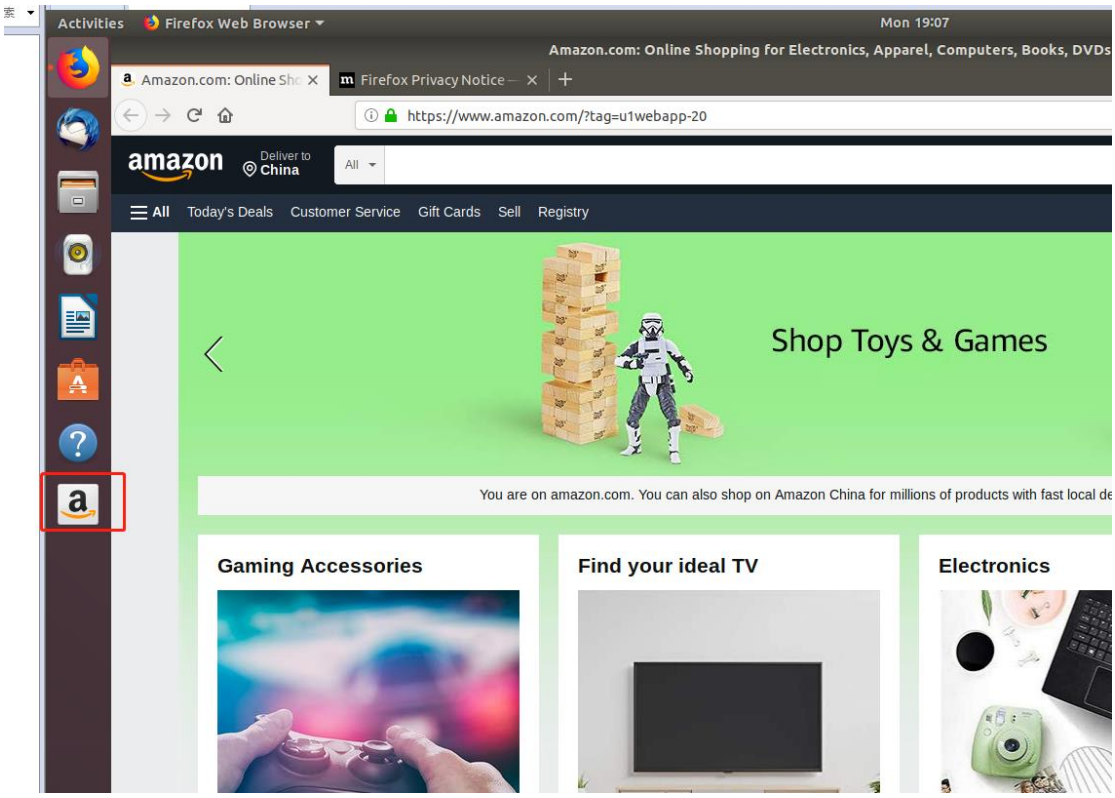
Choose “No, don’t send system info” and click “Next”.



Click “Done” to finish the installation.



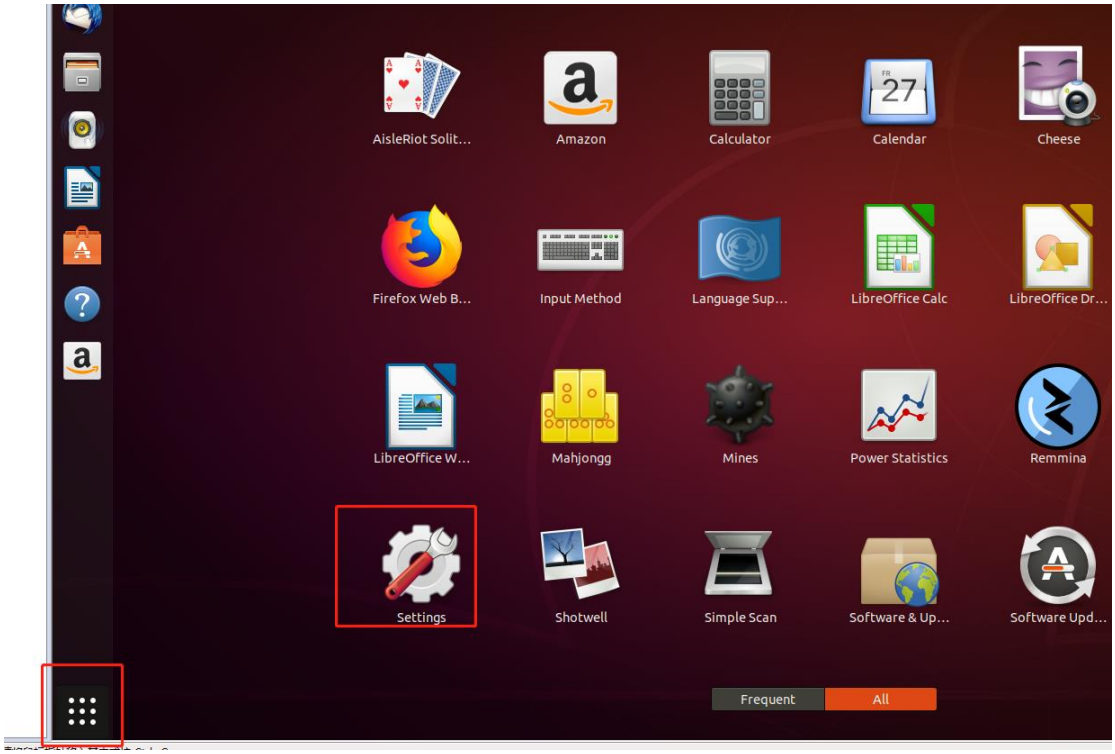
The virtual machine’s Linux system has been installed.

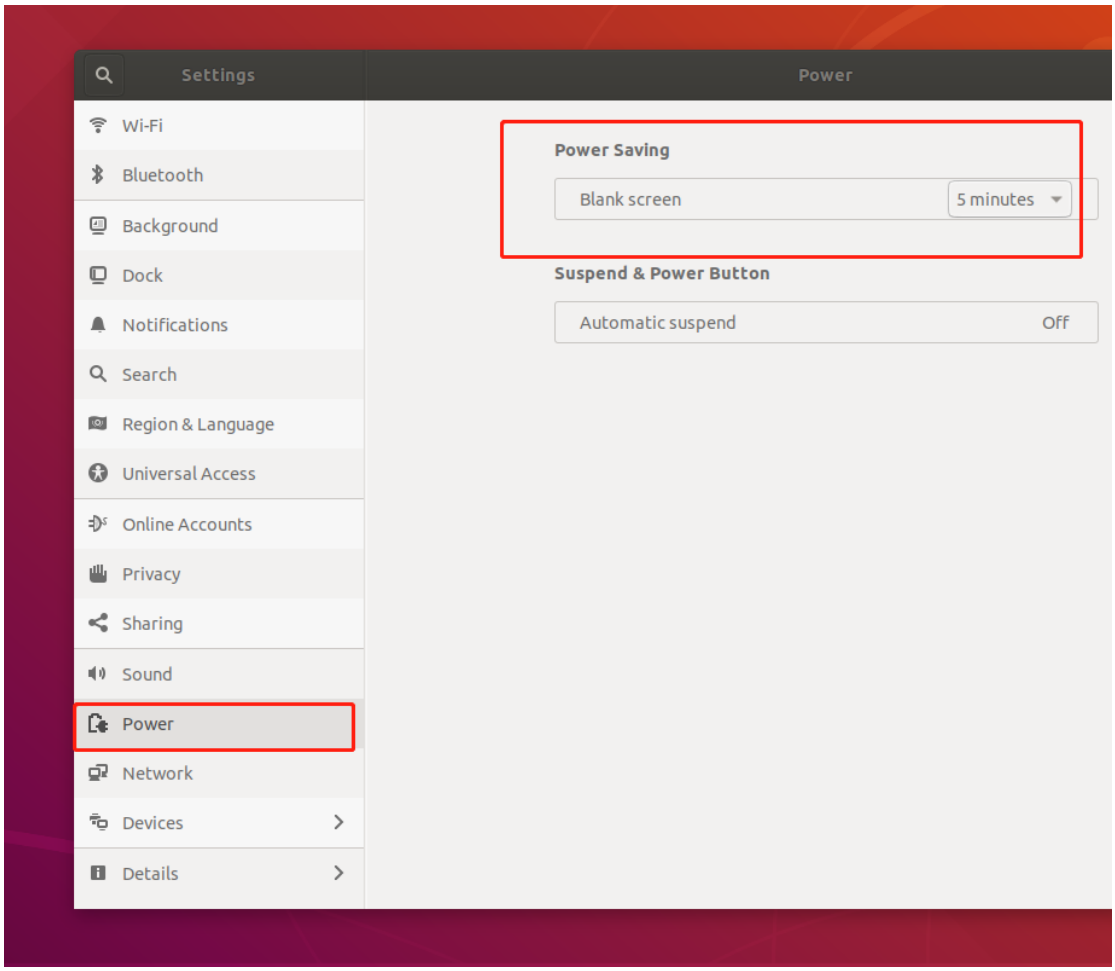


Open the website to check whether the Internet service is available.

2.1.2Setup:

1.Close the screen saver (Choose “Never”).

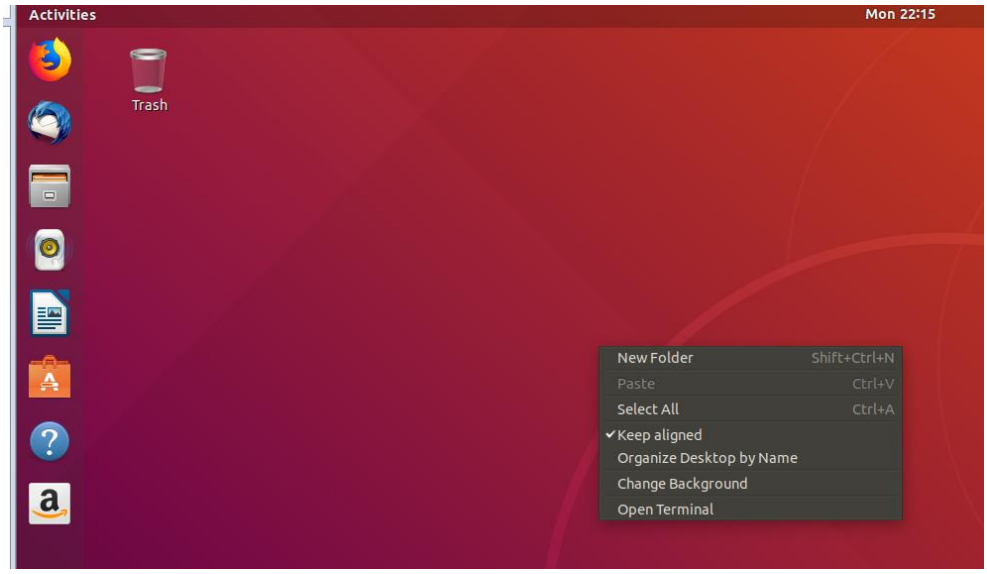




Change “5 mins” to “Never”

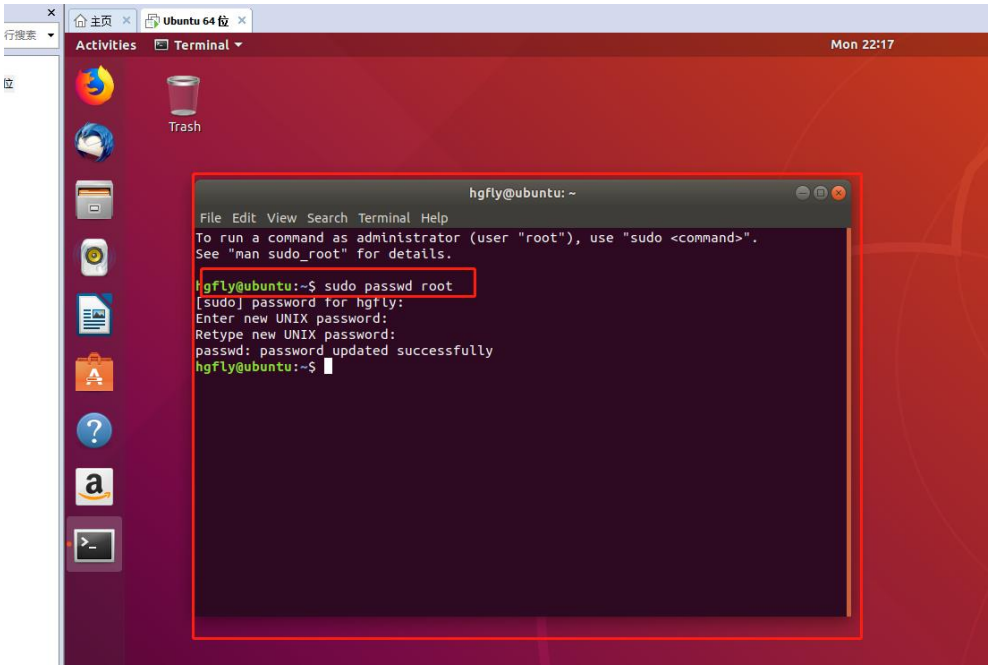
2.Open the terminal.

(Right click the mouse on the Linux system desktop and choose “Open Terminal”.)



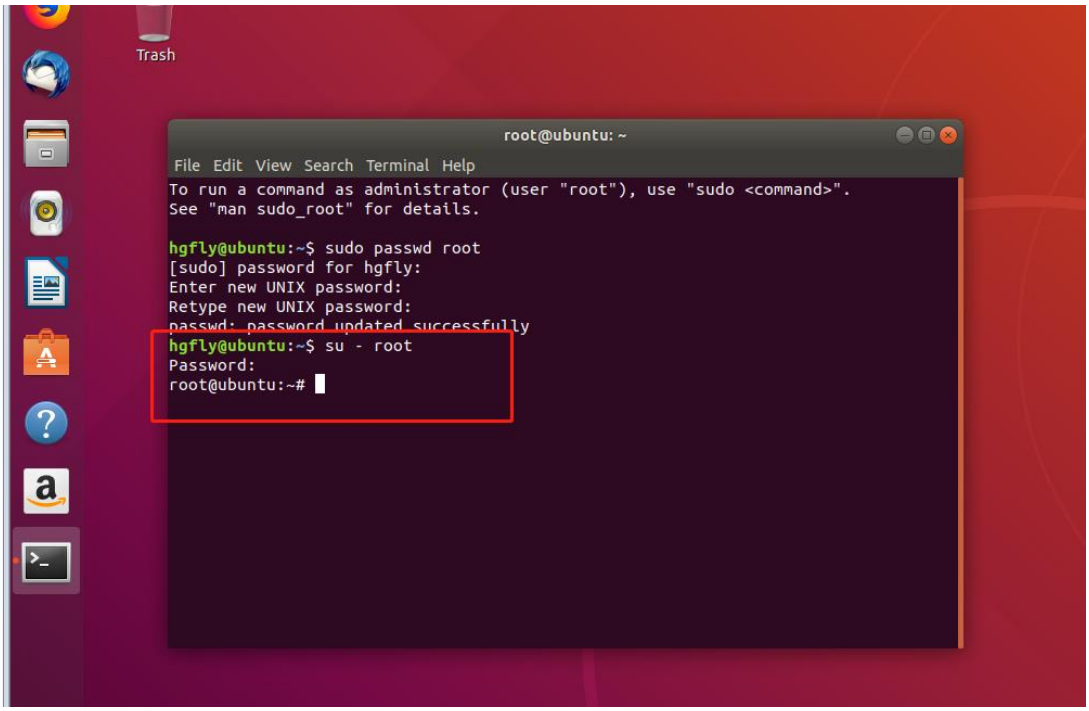
3.Reset the root password.

On the terminal page, enter “sudo passwd root”. Enter the password (hgfly) after next 3 task.



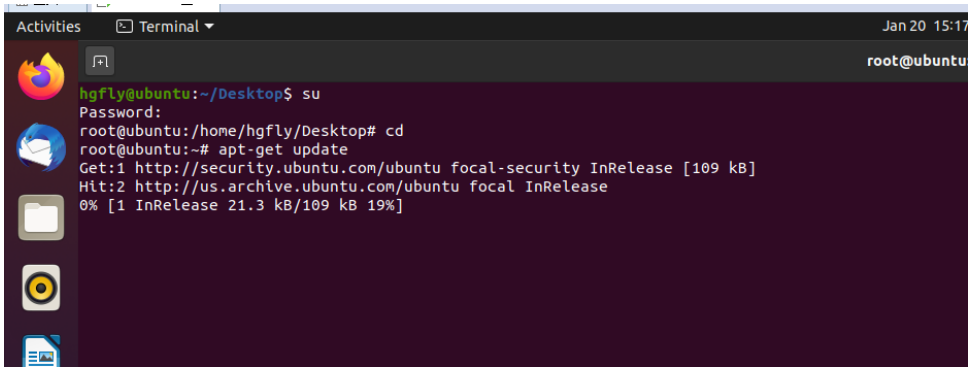
4.Change to the root user.

Enter the password (hgfly) through “su – root”, or directly enter “su”, press “Enter” and then enter the password.

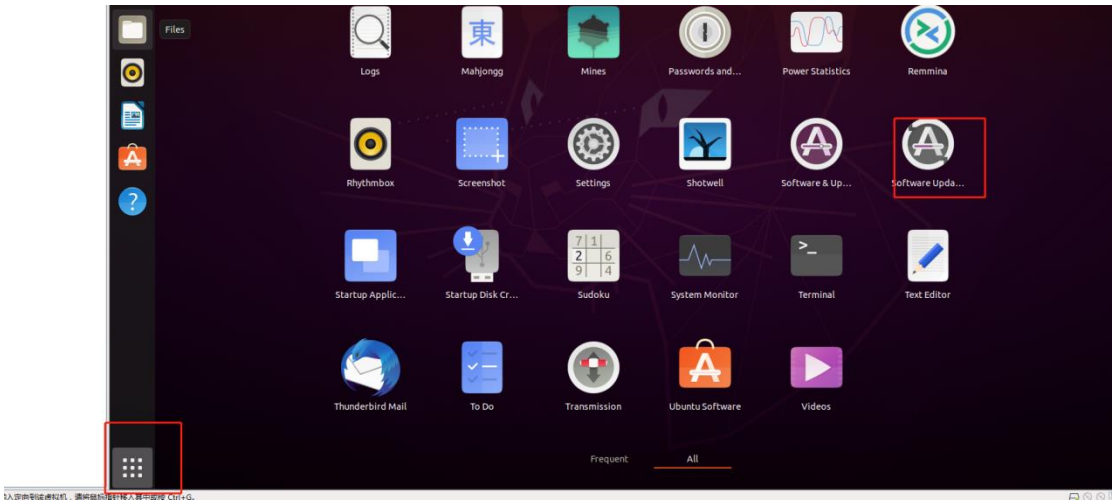


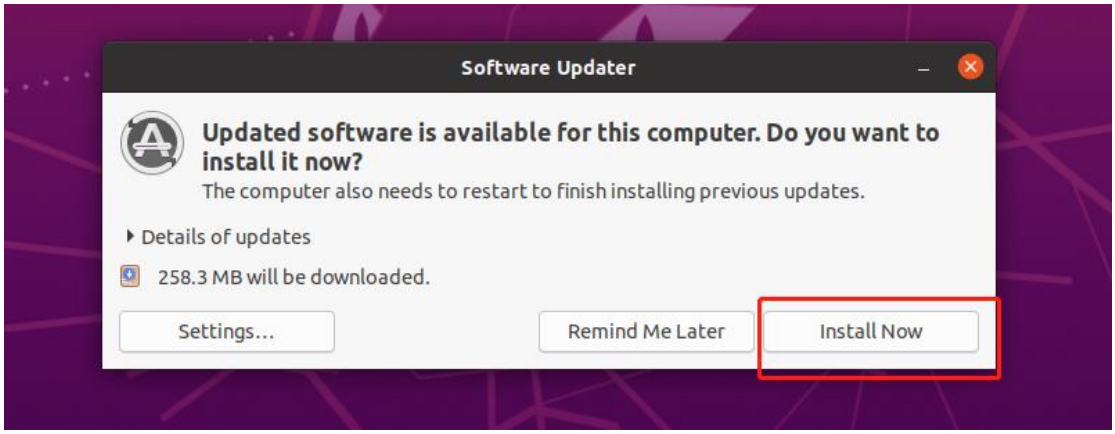
5.Update system patches.

Change to the root user and execute “apt-get update”. Make sure do this while the Internet service is available. Open the browser on the Linux system desktop beforehand to check if internet service is available.

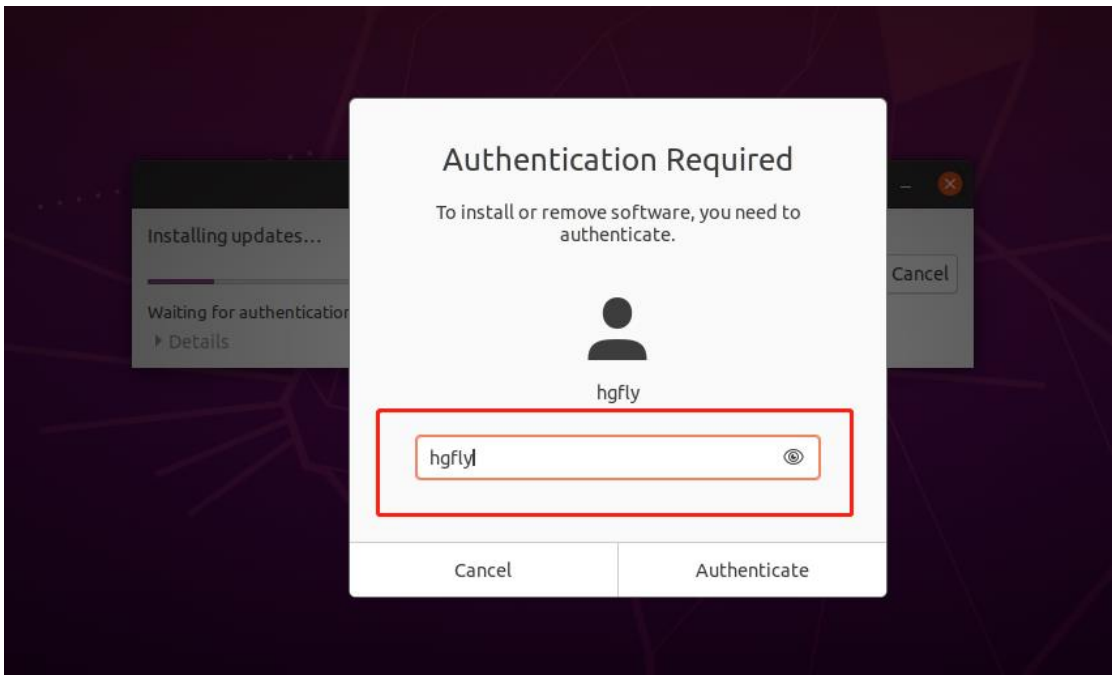


Click “start manual”, click “soft update”

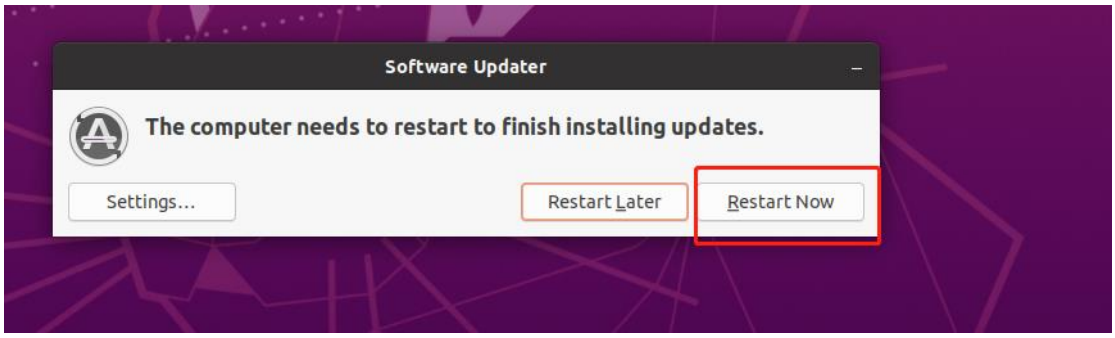




Click “install now”



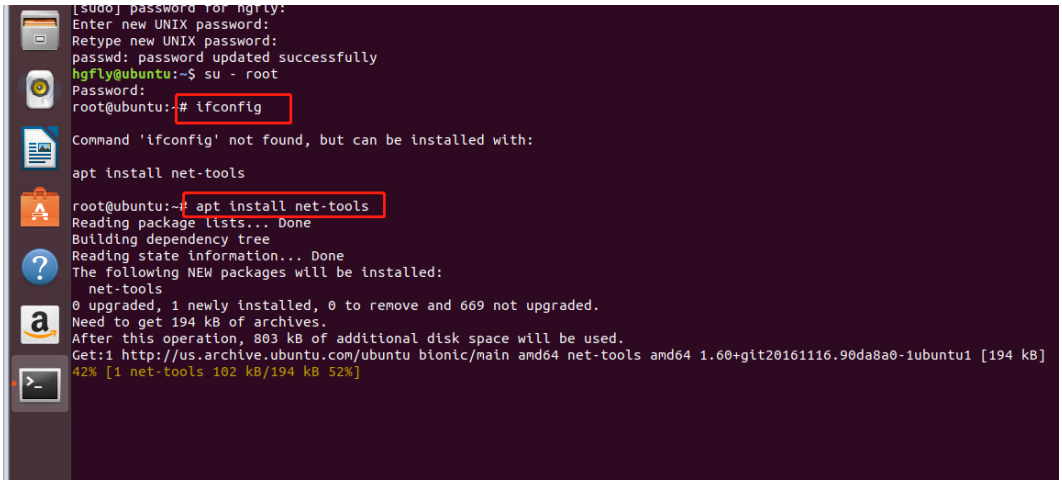
Enter the password “hgfly”



Restart

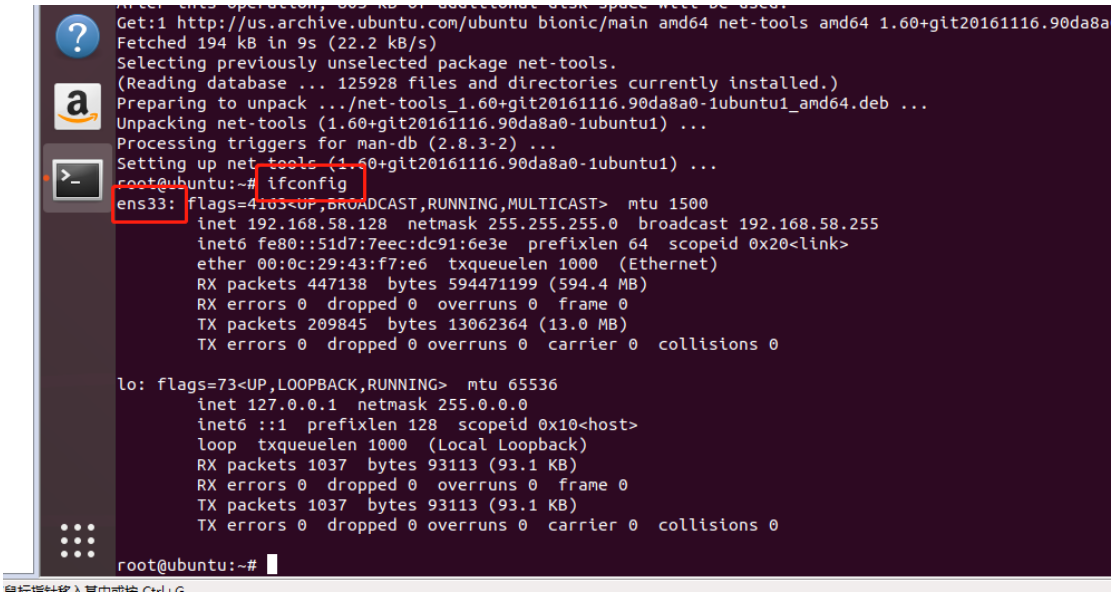
6.Install net-tools.

Enter “apt install net-tools” to install.



7.Check the IP and the device number.

Enter command “ifconfig”. The network card device number is “ens33”.

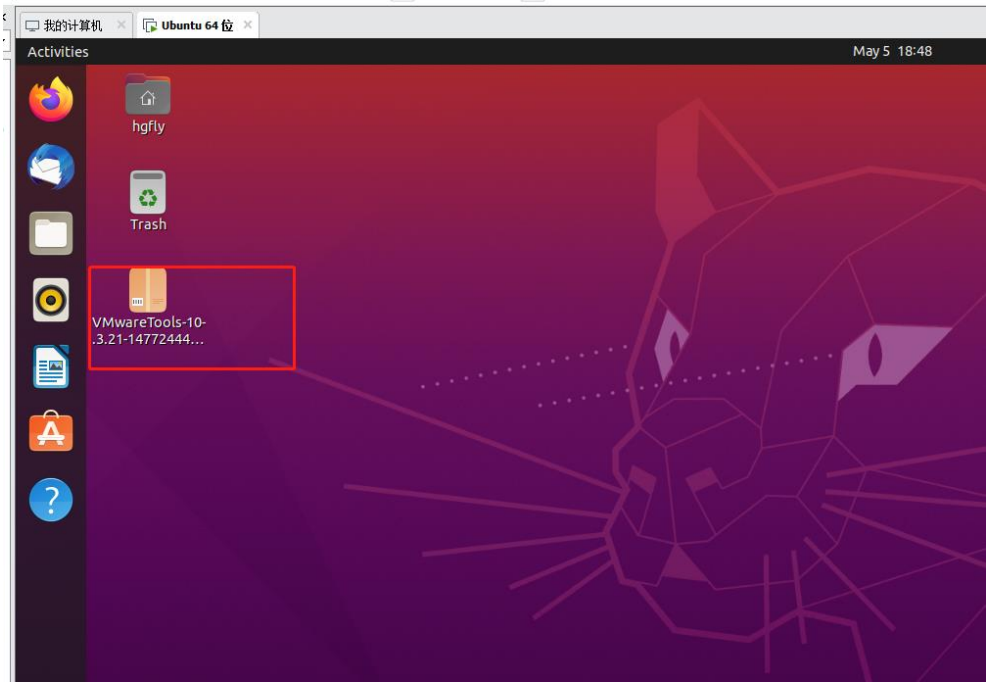


8.Install VMware Tools.

If this installation is not done correctly, Windows will fail to copy files and paste them onto the virtual machine desktop and to share files with the virtual machine.

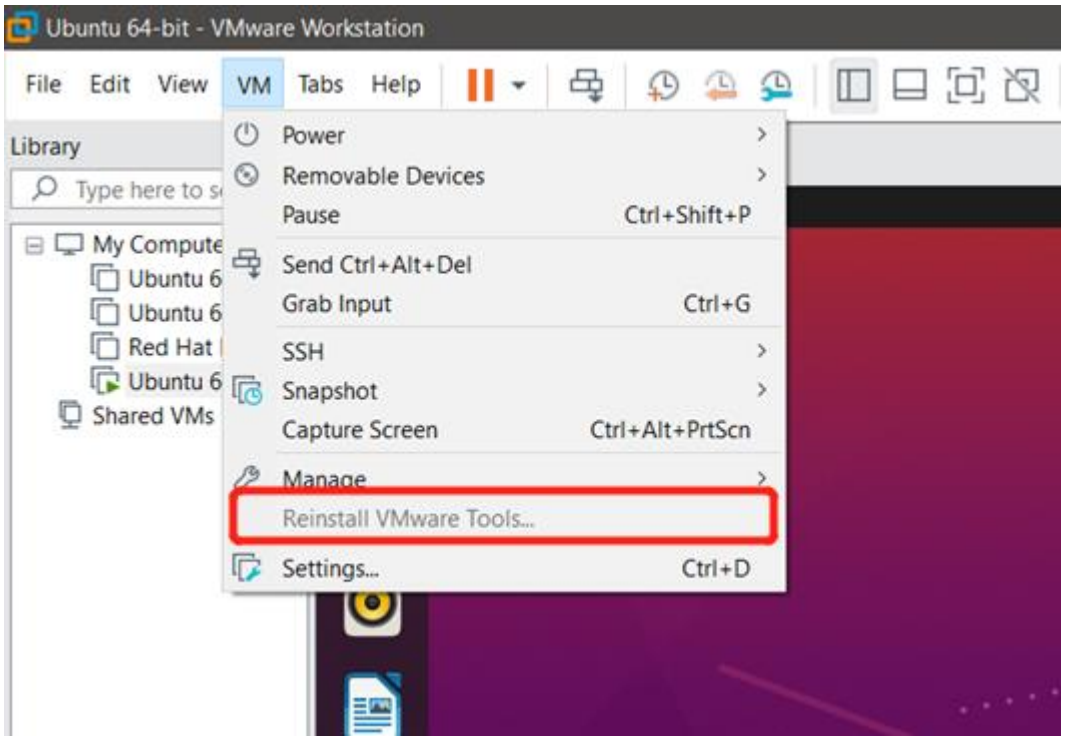
First step:

One: copy directly to the linux desktop, click “copy the file” in Windows, and copy to Linux desktop;

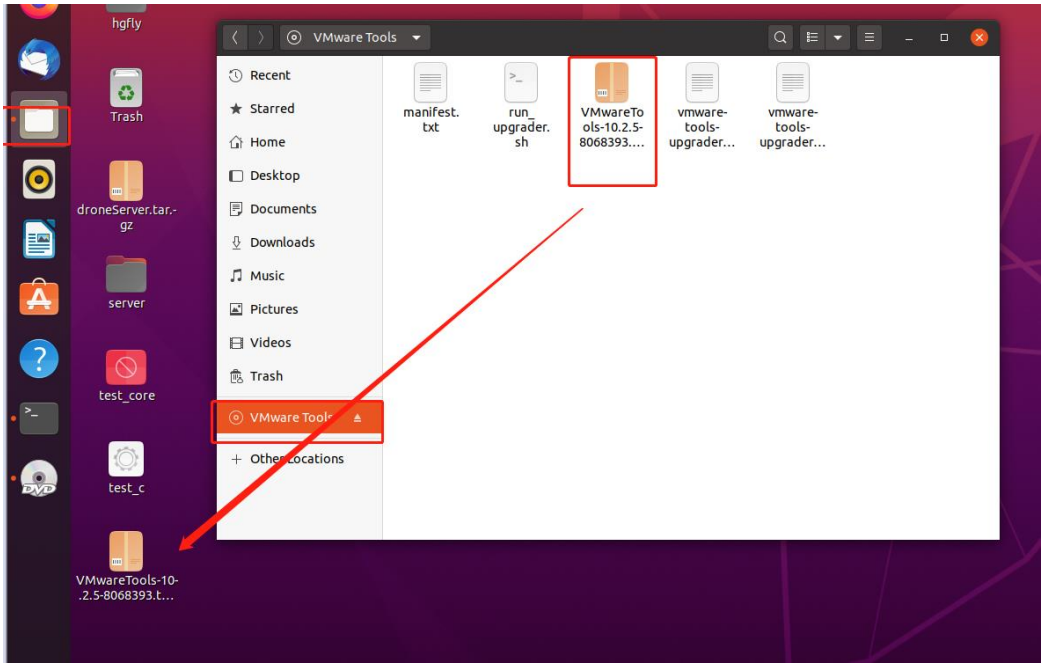


Another: For the virtual machine 15.5 version, VMware Tools becomes gray, please refer to task 8 of the FAQ before installing.

If setup in step 10 can be done normally, which means that this step has been done properly during system installation; click the following menu in the red box to install (if the installation fails, reinstall it).



After the installation above, open the corresponding file, then open VMware Tools, find the VMware package and copy and paste it to the desktop.



The second step:

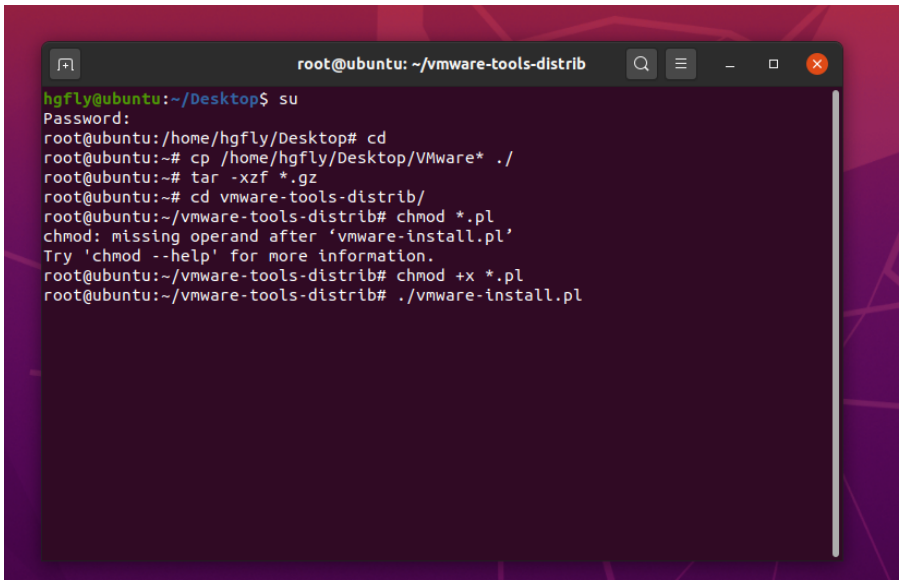
As in the figure below, enter “su” to change to the root user. After that, enter “cd” and press “Enter” to return to the root directory copy “vmtool” to root directory “cp /home/hgfly/Desktop/VMware* ./”.

Uncompressing file “tar -xzf *.gz”, enter uncompressing directory “cd vmware-tools-distrib”,

Add pl to execute permission “chmod +x *.pl” and “./vmware-install.pl”, and execute them.

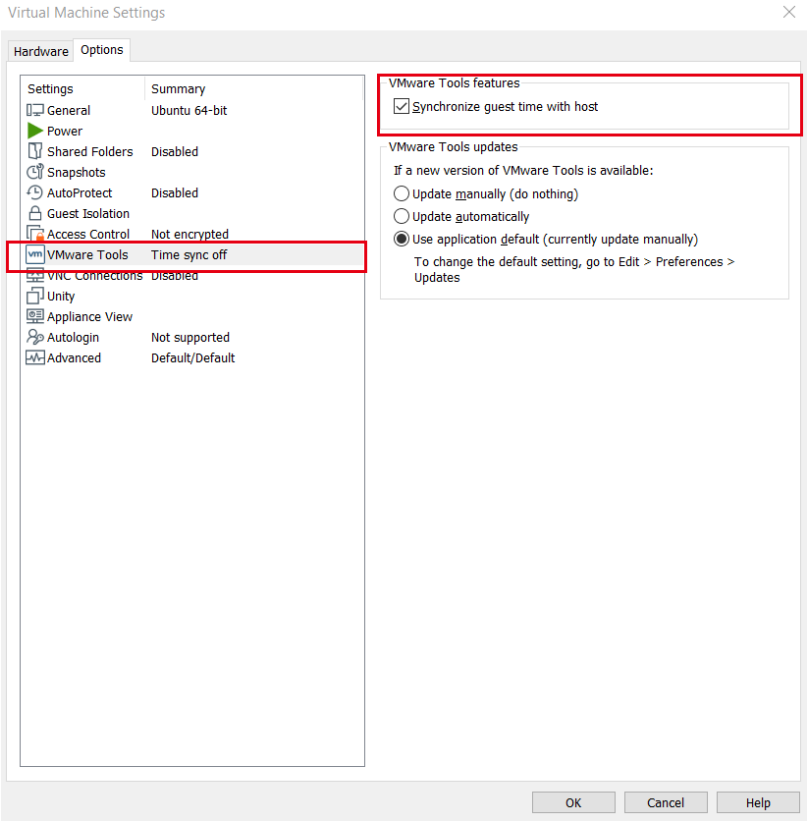
The first time you are prompted to enter the letter y and press Enter.

When the pause prompt appears in the future, press Enter. If there is a prompt [yes] or [no], enter y and press Enter until the installation is complete.

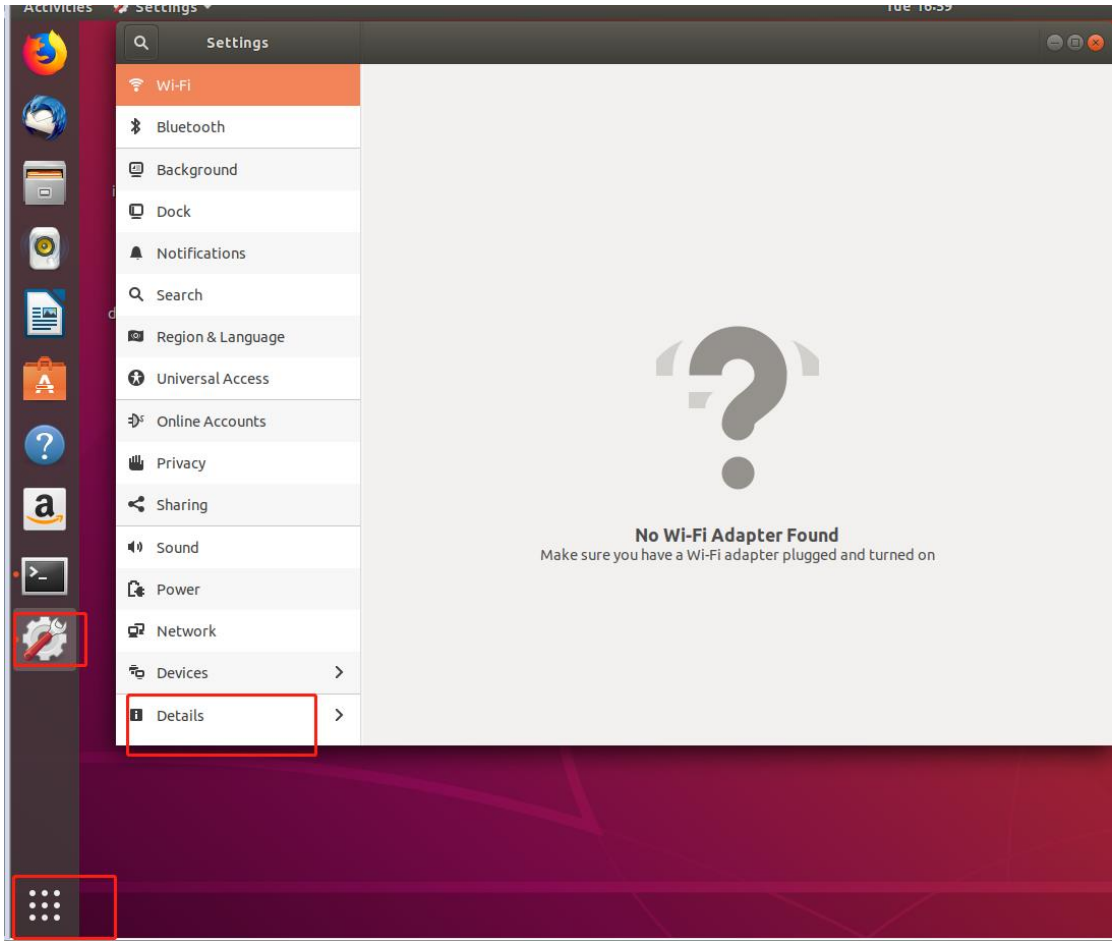


9.Set time synchronization.

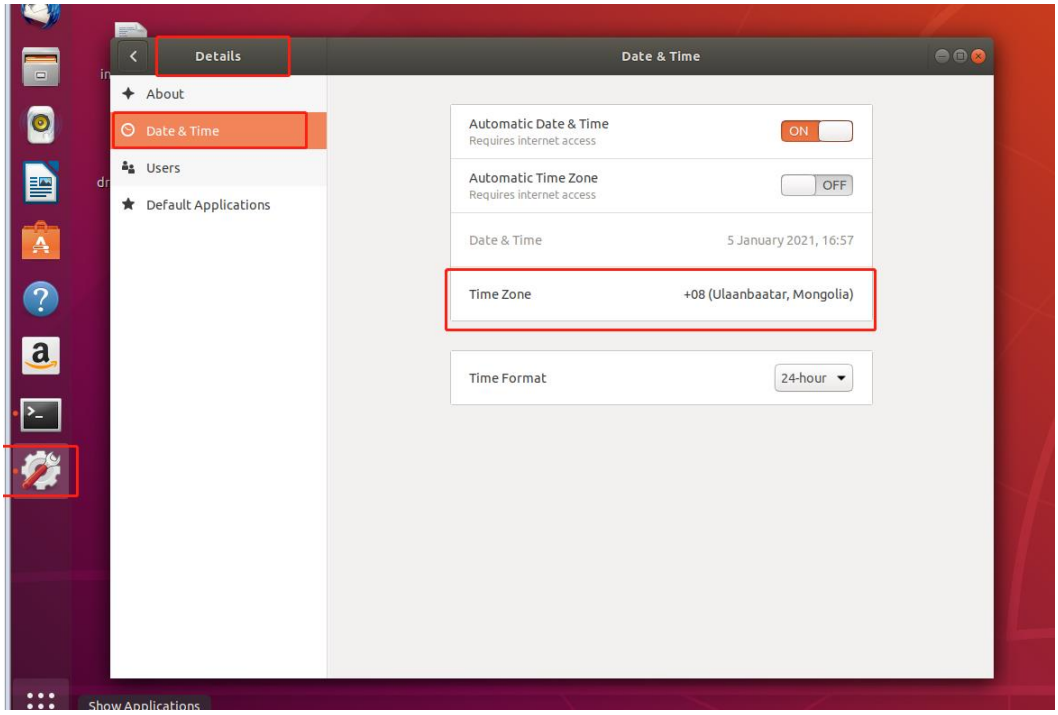
On the setup page of the virtual machine as in the figure below, check the box in front of “Synchronize guest time with the host” under the “VMware tools” option and click “OK”.



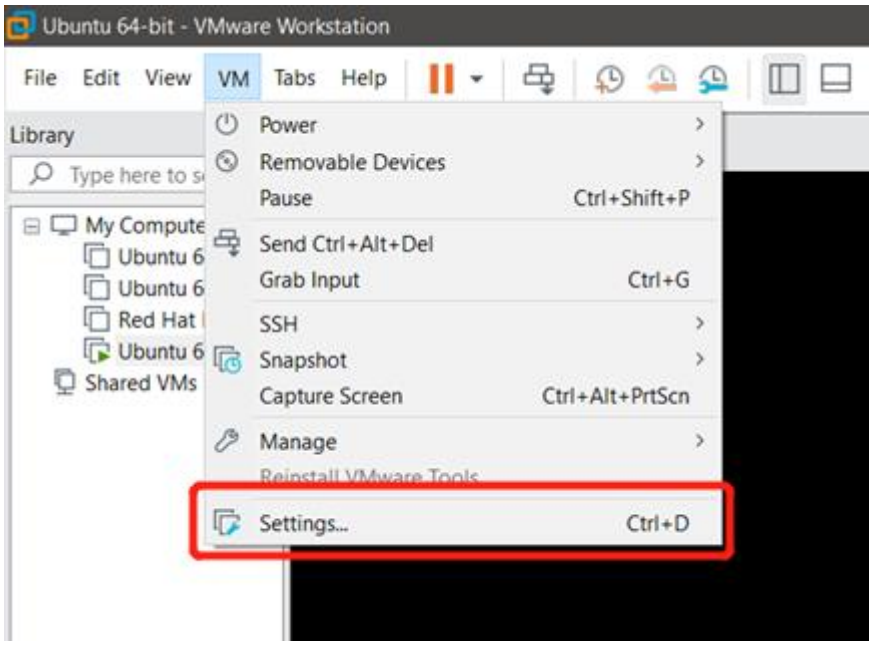
Click the setup symbol of the virtual machine.



Click the “Time Zone” option and set it as “+08 (Ulaanbaatar, Mongolia)”.

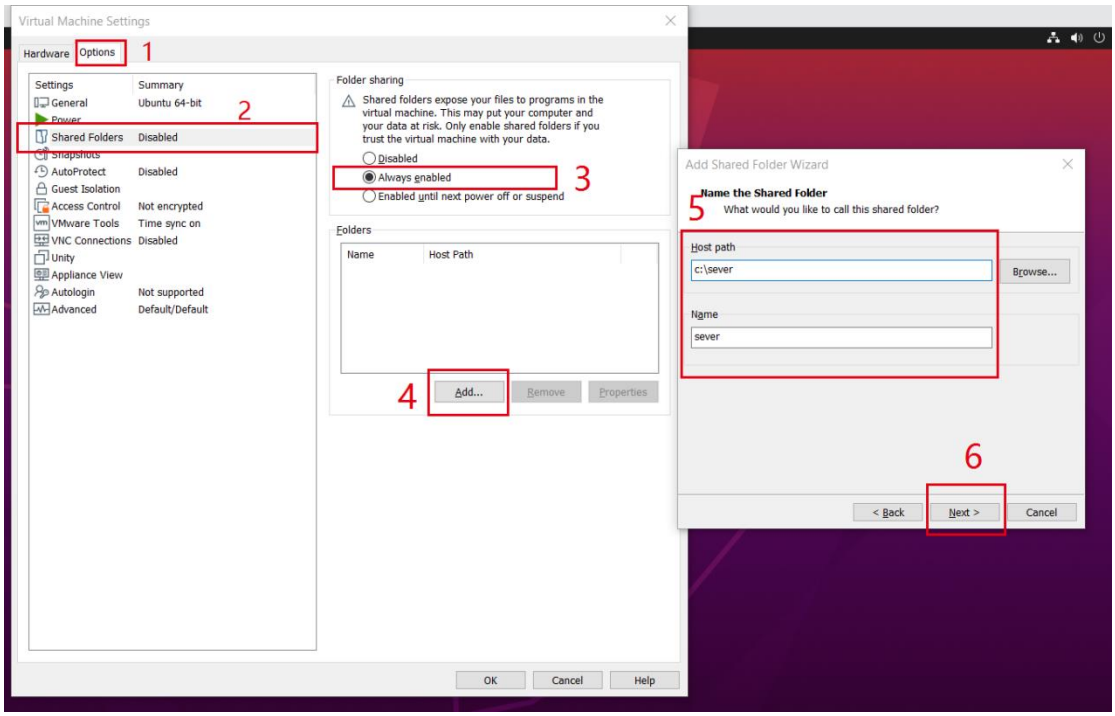


10.Set folder sharing.



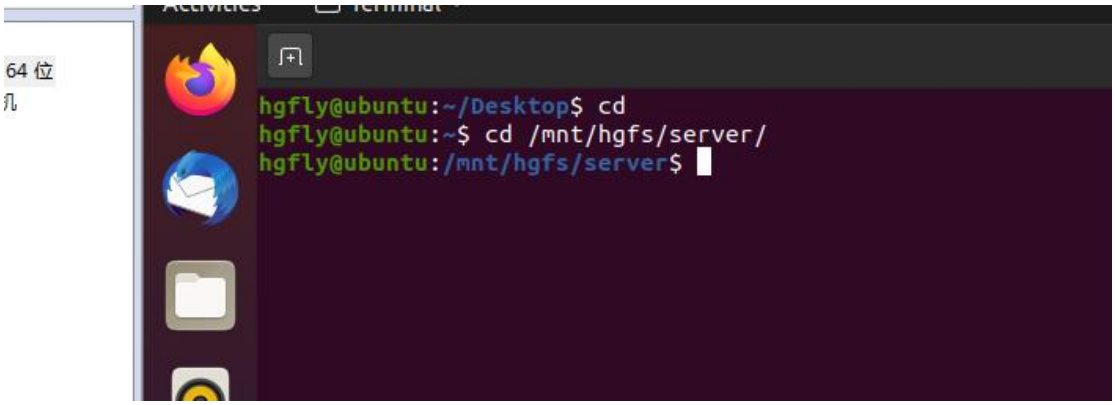
Find folder “server” on disc C;

Click “Options”, “Share holder”, “Always enabled” and “Add” in sequence. Enter “server” under the “Name (N)” option and “C:\\server” under the host computer path. These two contents must be entered correctly to make sure the formation service program can be updated automatically.



Finally, check whether file sharing has succeeded.

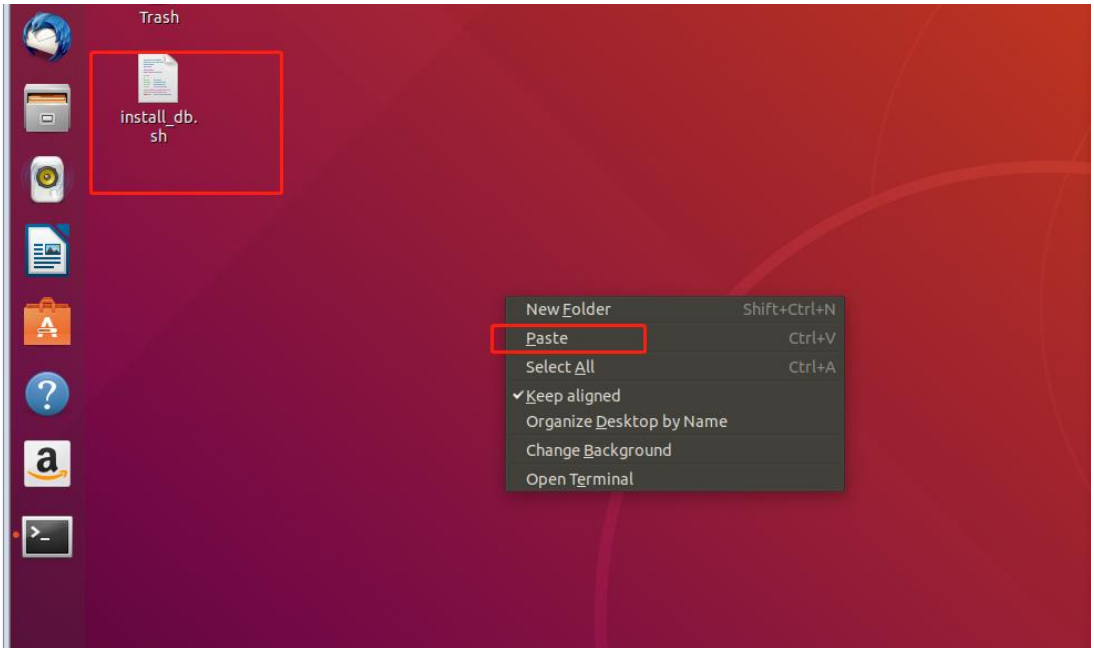
On the Linux system terminal execution page (see the figure below), if there is no directory “hgfs”, it suggests that Vmware Tools installation has failed and needs to be installed again.



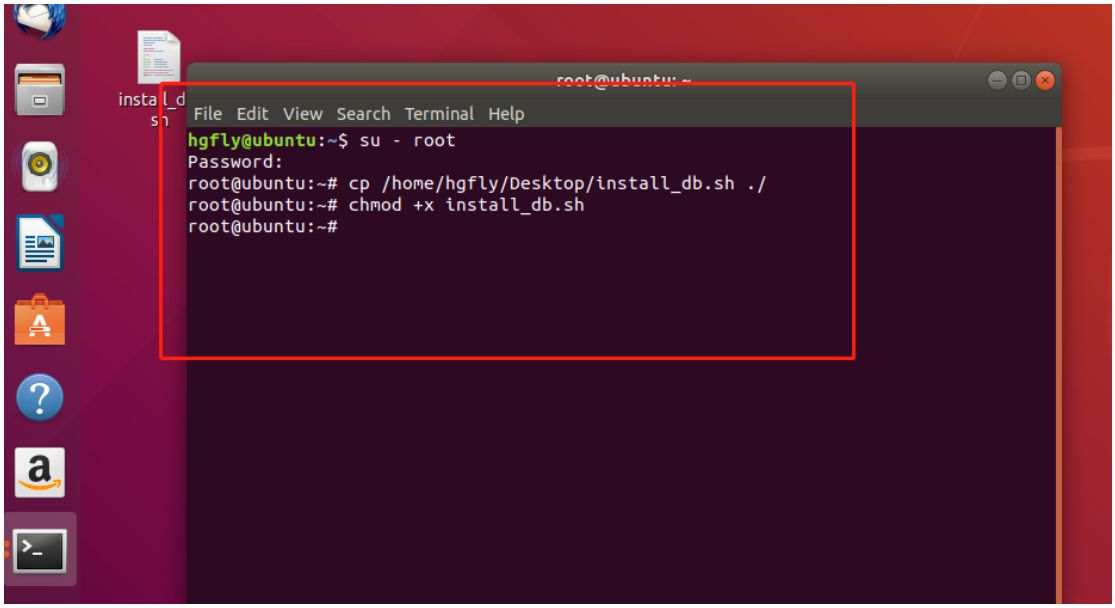
2.1.3.Install the database (optional).

If Vmware Tools installation fails, Windows will fail to copy and paste files to the Linux system desktop of the virtual machine.

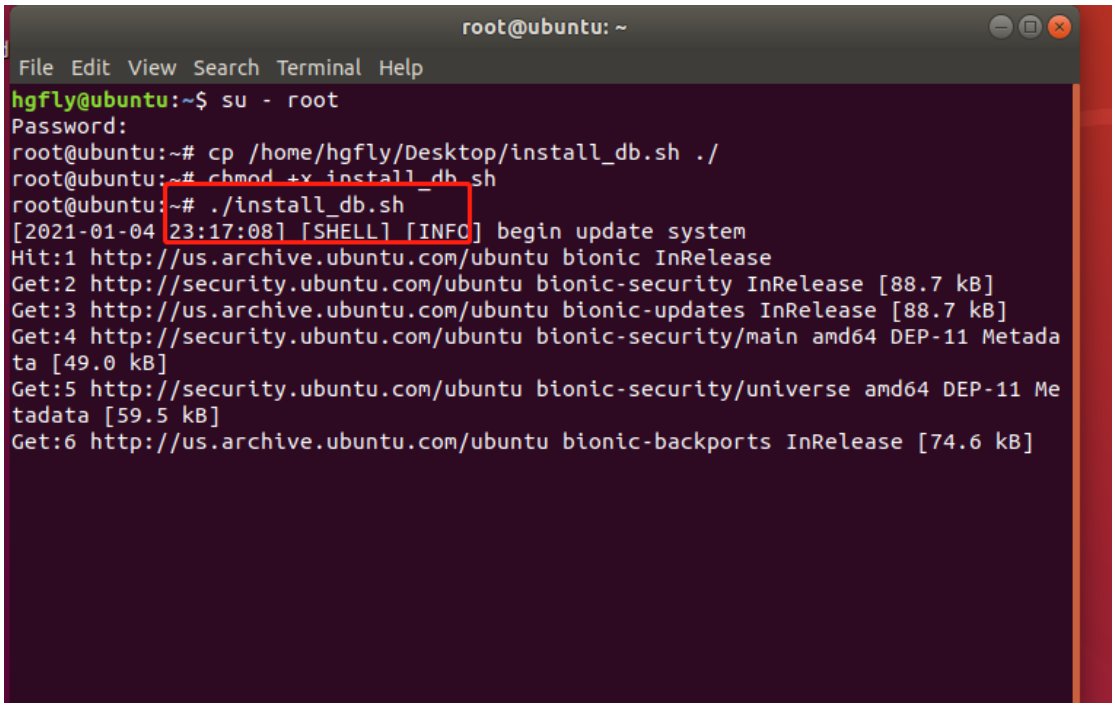
1. In the Windows system, copy the database installation file, right click the mouse on the Linux system desktop and choose “Paste”.



2、Open the terminal, change the root and copy the database installation file on the Linux system desktop to the current directory “cp /home/hgfly/Desktop/instll_db.sh ./
chmod +x install_db.sh ”with permission

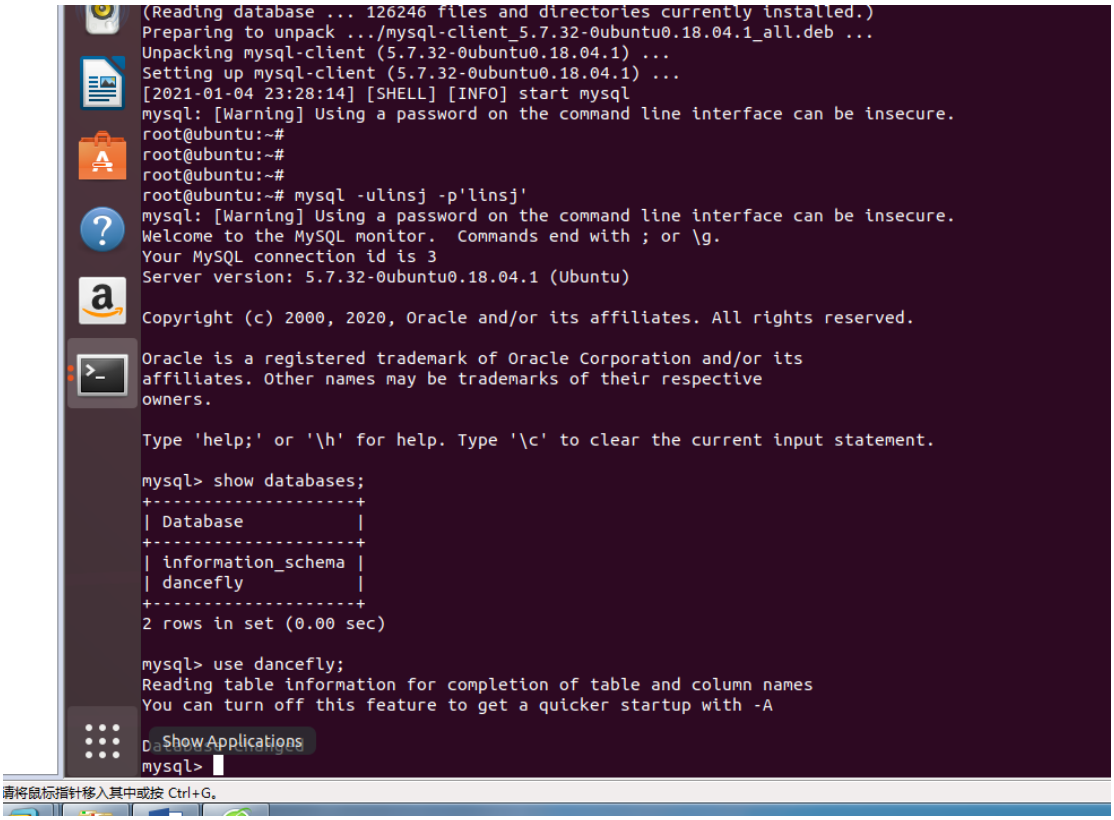


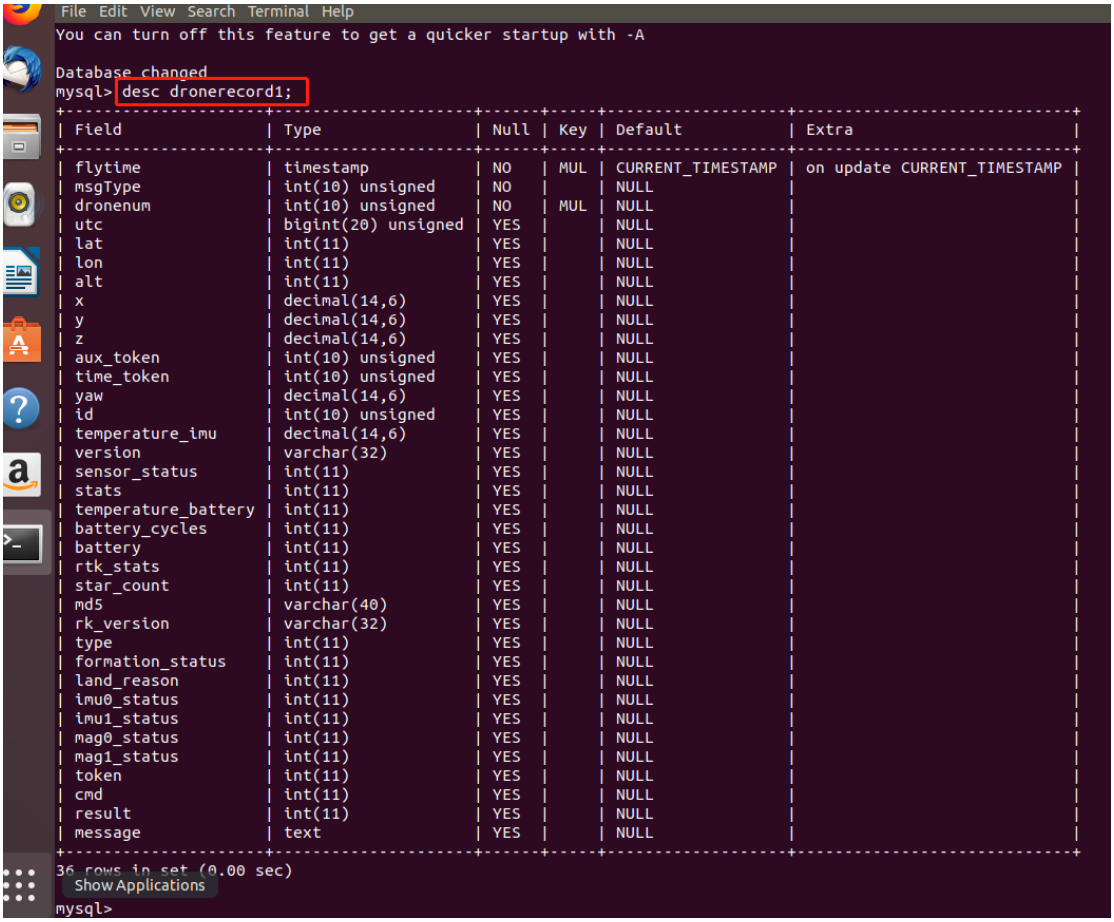
3. Run the installation program.



4.After installation, check mysql –ulinsj –p’linsj’ connection and enter “mysql

use dancefly" and "desc dronerecord1".





5. Change to the root user and start and stop mysql.

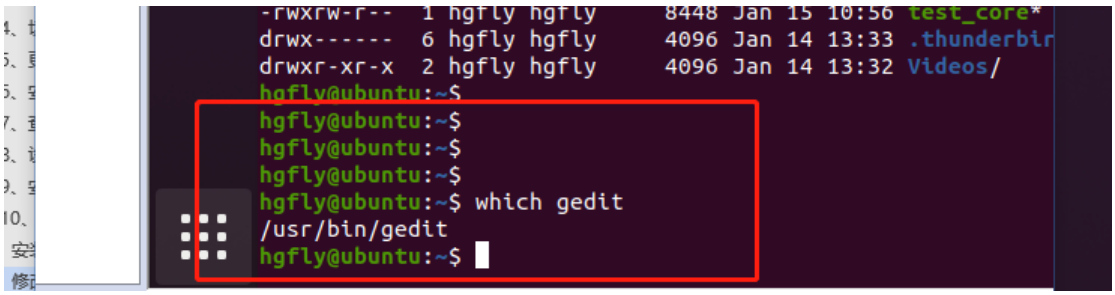
Start: service mysql start

Stop: service mysql stop

2.1.4Modify system parameters.

Check whether there is a gedit editor. If there is, modify system parameters on the editable page as in solution A; if there isn't, modify system parameters through the terminal as in solution B. The two solutions should not be chosen at the same time.

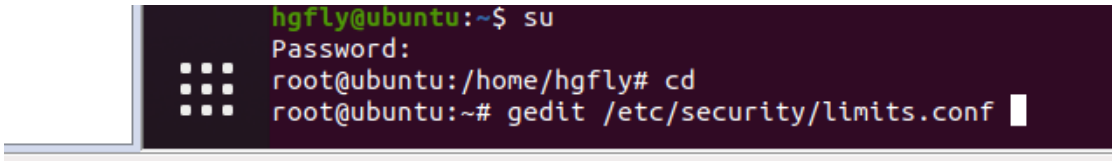
As in the figure below, command "which gedit" can be entered to check whether there is a gedit editor. According to the figure below, a gedit editor has been installed.



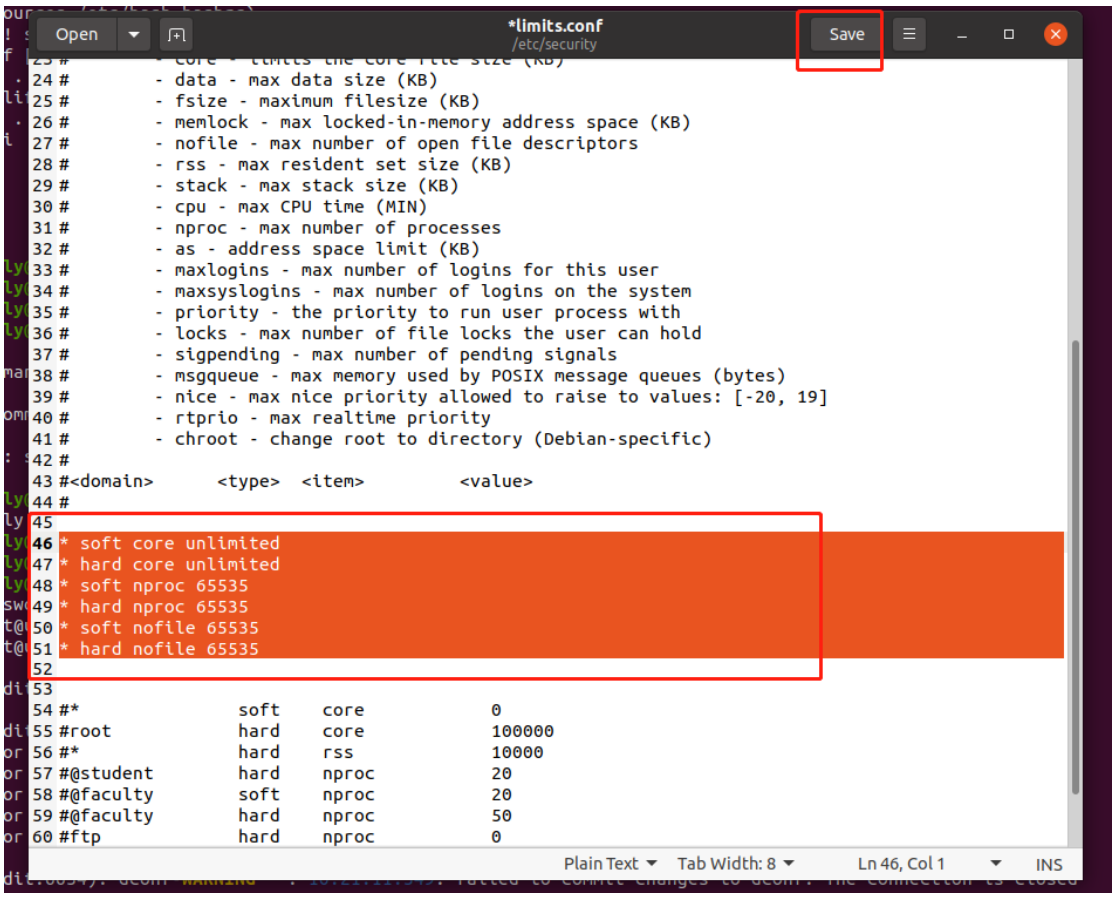
A.Modify on the editable page.

This setup is necessary when there are more than 200 drones, regardless of a self-owned Linux system of Windows, or a virtual machine.

1. Open the terminal in the Linux system, change to the root user, enter "cd", press "Enter", enter "gedit /etc/security/limits.conf" and press "Enter" again.



2. Add configuration.



Find a blank space, add the contents in the red box above and click “Save”. The following content can be copied.

* soft core unlimited

* hard core unlimited

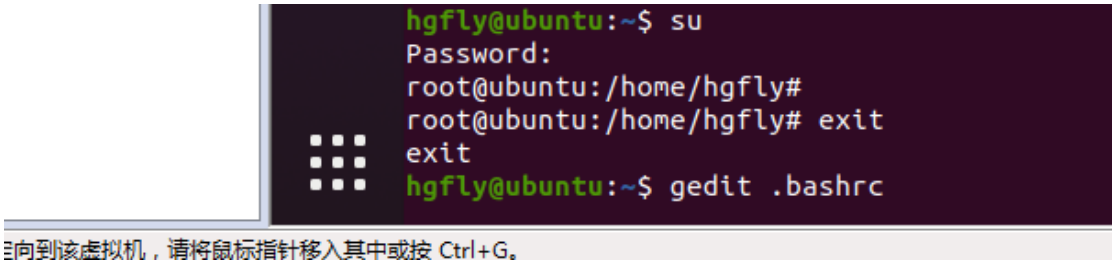
* soft nproc 65535

* hard nproc 65535

* soft nofile 65535

* hard nofile 65535

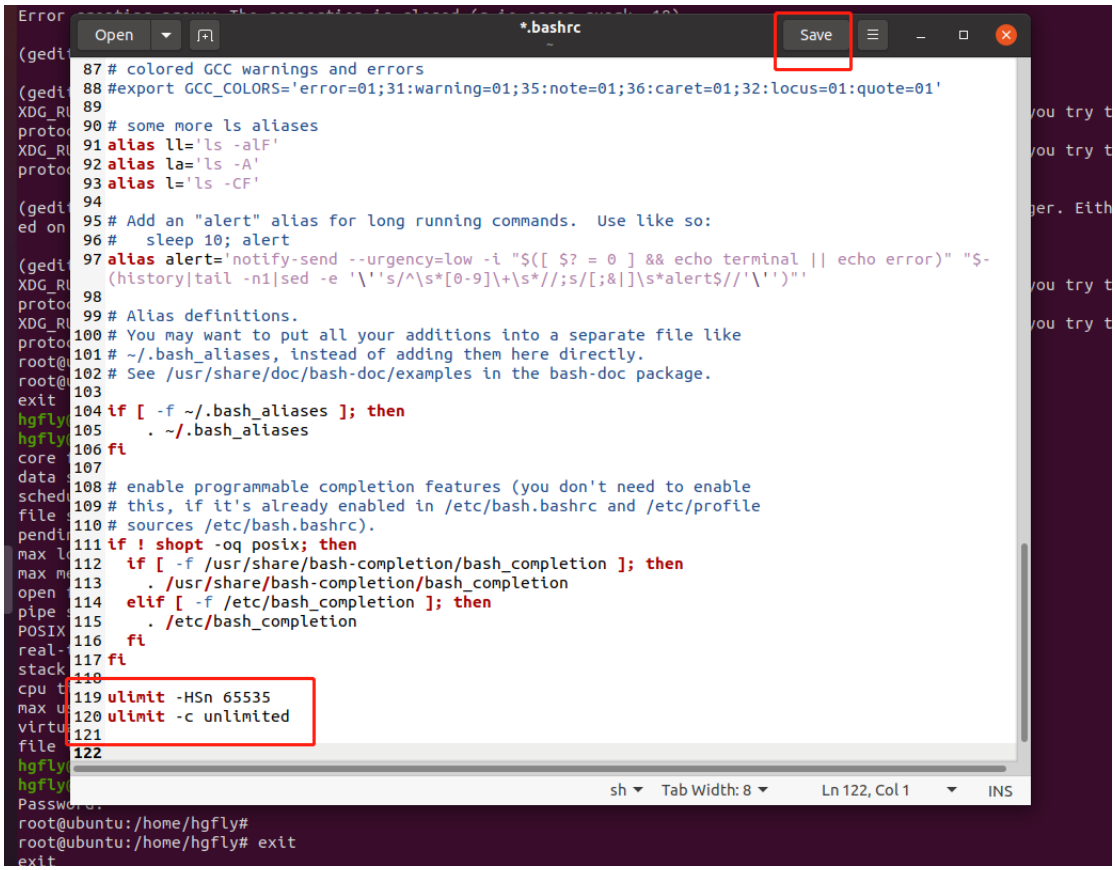
3. Modify the environmental configuration, exit the root user (click “Exit” and press “Enter”), enter “gedit .bashrc” and press “Enter” again.



Open the file, add the following content in the red box to the blank space at its end and click “Save”.

ulimit -HSn 65535

ulimit -c unlimited



4. Execute “source .bashrc” and “ulimit –a” in sequence. Check whether the two contents have been successfully modified as in the two red boxes in the figure below.