PENQUEST

PLAYER MANUAL

ATTACK. DEFEND. LEARN.

Menus, game setup and gameplay of the PenQuest cybersecurity game.

pen.quest · for PenQuest v2.0.0

v1.0 · 2026-11-13 · English

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CHAPTER 01

INTRODUCTION

What PenQuest is and how this manual works.

PenQuest is a digital game about IT security. One player attacks a company's infrastructure, the other defends it. Every action in the game is based on real security frameworks.

1.1 WHAT IS PENQUEST?

PenQuest is a digital two-player board game. The board shows an abstracted IT infrastructure, from a small home network to a large company network. Each player has a hand of action cards and can buy equipment.

The game teaches how cyber attacks work and how to defend against them. It is made for students, trainees, managers and security professionals. A game takes between 15 minutes and several hours, depending on the size of the scenario.

The rules are not made up. Attack actions are taken from MITRE ATT&CK, a knowledge base of real adversary techniques. Defense actions come from MITRE D3FEND and NIST SP 800-53. Everything you can do or buy in the game exists in real IT systems.

1.2 ATTACK AND DEFENSE

ATTACKER

Works through the attack stages `Reconnaissance` `Initial access` `Execution` to reach the scenario's goal.

DEFENDER

Uses `Detection` `Prevention` `Response` actions to stop the attacker.

The attacker wins by reaching the scenario's goal, for example by damaging a certain server, before their turns run out. The defender wins by stopping the attacker until no turns are left. Neither side sees the other's cards, so detecting what the opponent does is part of the game.

1.3 HOW TO USE THIS MANUAL

Buttons and menu items look like this: `Back to settings`, the main button of a page like this: `Start game`. Paths through the menus: Main menu › New game › Game options.

Colours carry meaning, as in the game: `Attack` `Defense` `Support` `Equipment` `Asset`.

Chapters 2 to 5 lead you from signing in to the start of a game. Chapter 6 explains the rules and the game board. Chapters 7 to 9 cover the card library, your progress and the administration of an organization. The appendix lists all game options and explains the most important terms.

> ⓘ Screenshots marked “Prototype” show the new lobby as designed. Details can differ in the live version.

CHAPTER 02

GETTING STARTED

Sign in, find your way around the header bar and the main menu.

2.1 SIGNING IN

PenQuest runs in the browser at pen.quest. You need an account to play.

Getting an account

Accounts are created by invitation. Ask your instructor or the PenQuest team for one. You then get an e-mail with a link to finish the registration. If the e-mail does not arrive, check your spam folder.

Students and staff of USTP do not need an invitation. They sign in with **Sign in with USTP Campus Login** and their university account.

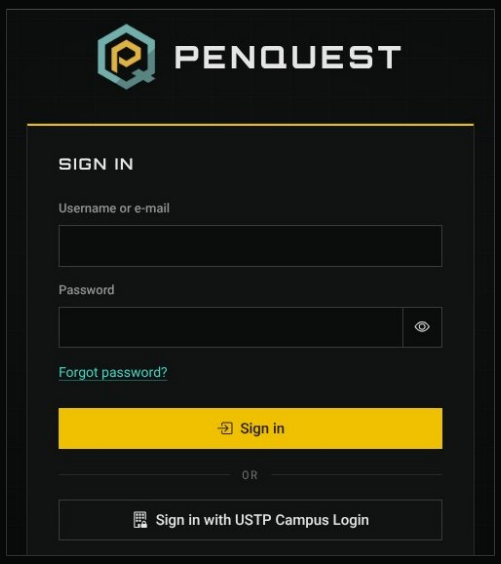


FIGURE 2.1 The sign-in page. PROTOTYPE

Signing in with a password

01 **Enter your name**
Type your username or e-mail address.

02 **Enter your password**
The eye button shows what you have typed.

03 **Sign in**
Click **Sign in**. The main menu opens.

Forgot your password?

Click **Forgot password?**, enter the e-mail address of your account and click **Send reset link**. The e-mail contains a link to set a new password. You can change your password later under **User menu** › **Account**, see below.

2.2 THE HEADER BAR

The header bar is visible on every lobby page after you sign in.

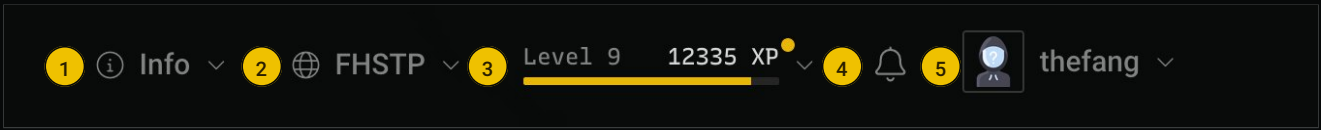


FIGURE 2.2 The header bar.

1. **Info** – information about PenQuest and the changelog.
2. **Organization** – the organization you play in, for example Community or your course. Click it to switch organizations.
3. **Level and XP** – your level and experience points; opens Progress.
4. **Notifications** – game and event invitations.
5. **User menu** – `Account` (avatar, e-mail and sign-in) and `Log out`.

Your account

Open User menu › Account. The account page shows your avatar, username and e-mail address. Click `Change avatar` to pick another avatar. Password, multi-factor authentication (MFA) and username are managed on the sign-in service: click `Manage account` to open it in a new tab.

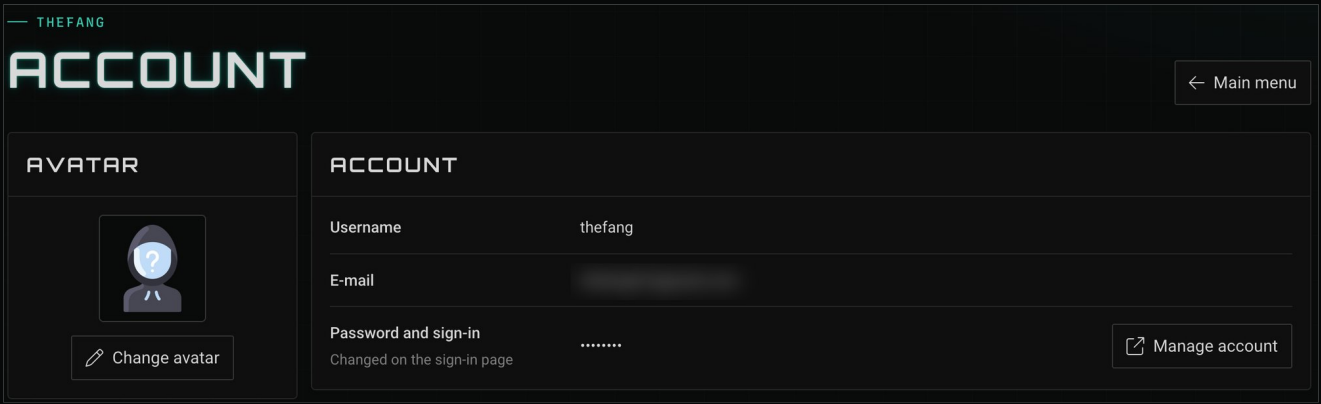


FIGURE 2.3 The account page.

2.3 CHANGING THE LANGUAGE

PenQuest is currently available in English only.

2.4 THE MAIN MENU

After signing in you land on the main menu. From here you reach every part of PenQuest. The line above the greeting shows the organization you are playing in.

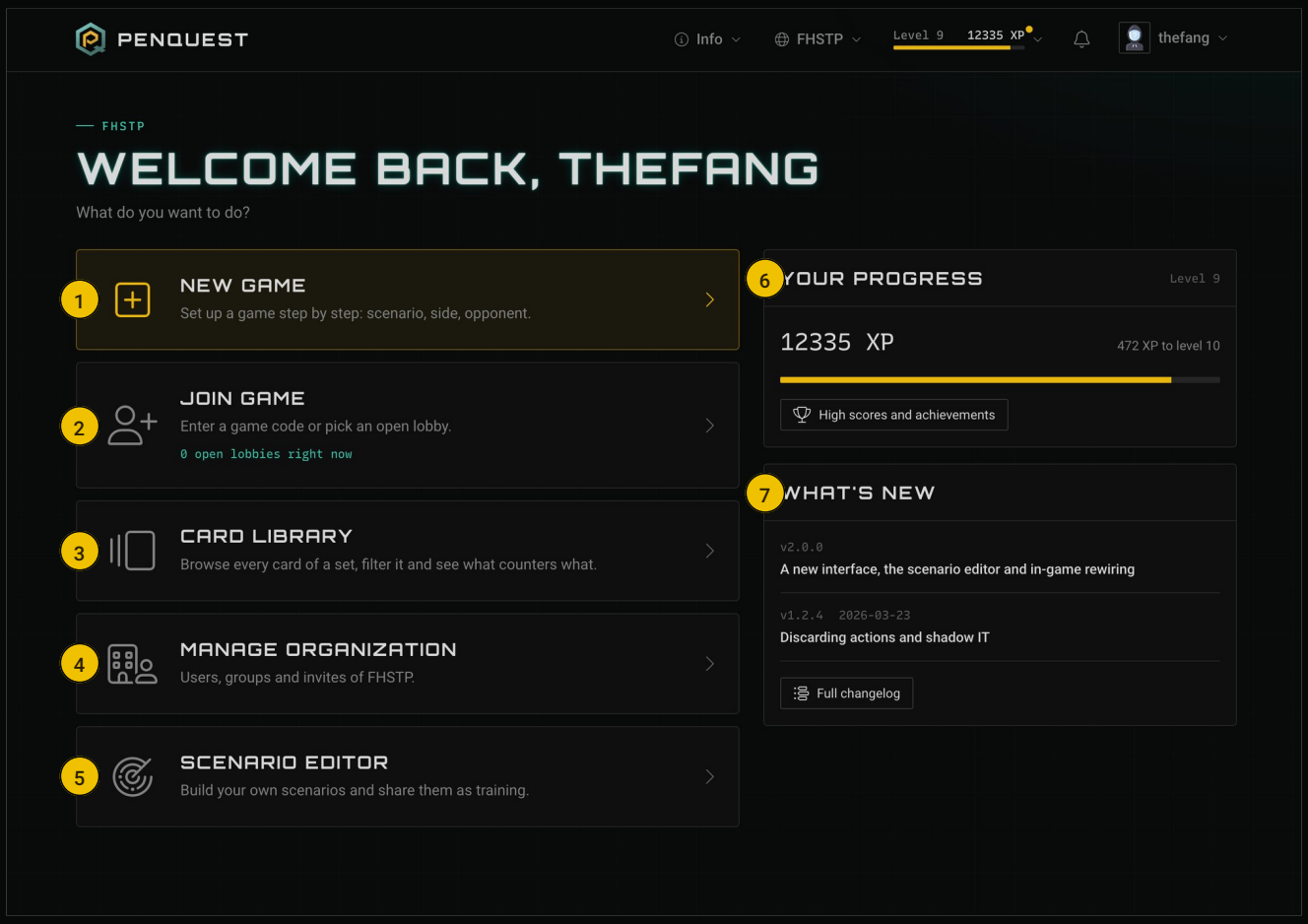


FIGURE 2.4 The main menu of an organization admin.

1. **New game** – set up a game step by step, see chapter Setting up a game.
2. **Join game** – enter a game code or pick an open game. The line below shows how many games are waiting for a player.
3. **Card library** – browse all actions outside a game, see chapter Card library.
4. **Manage organization** – only for organization admins, see chapter Organization administration.
5. **Scenario editor** – build your own scenarios and share them as training.
6. **Your progress** – XP, the XP to the next level and **High scores and achievements**.
7. **What's new** – the latest versions; **Full changelog** lists all changes.

> Click the PenQuest logo in the top left to return to the main menu from any lobby page.

> You can have only one game open at a time. If you left a game without finishing it, the main menu shows a banner with **Resume** and **Leave**; New game and Join game are not available until you resume or leave that game. See Winning and losing.

CHAPTER 03

SETTING UP A GAME

The six steps from scenario type to game options.

Open **Main menu** › **New game**. A new game is set up in six steps. Make one choice per step, then click **Continue**. The button on the left takes you back one step.

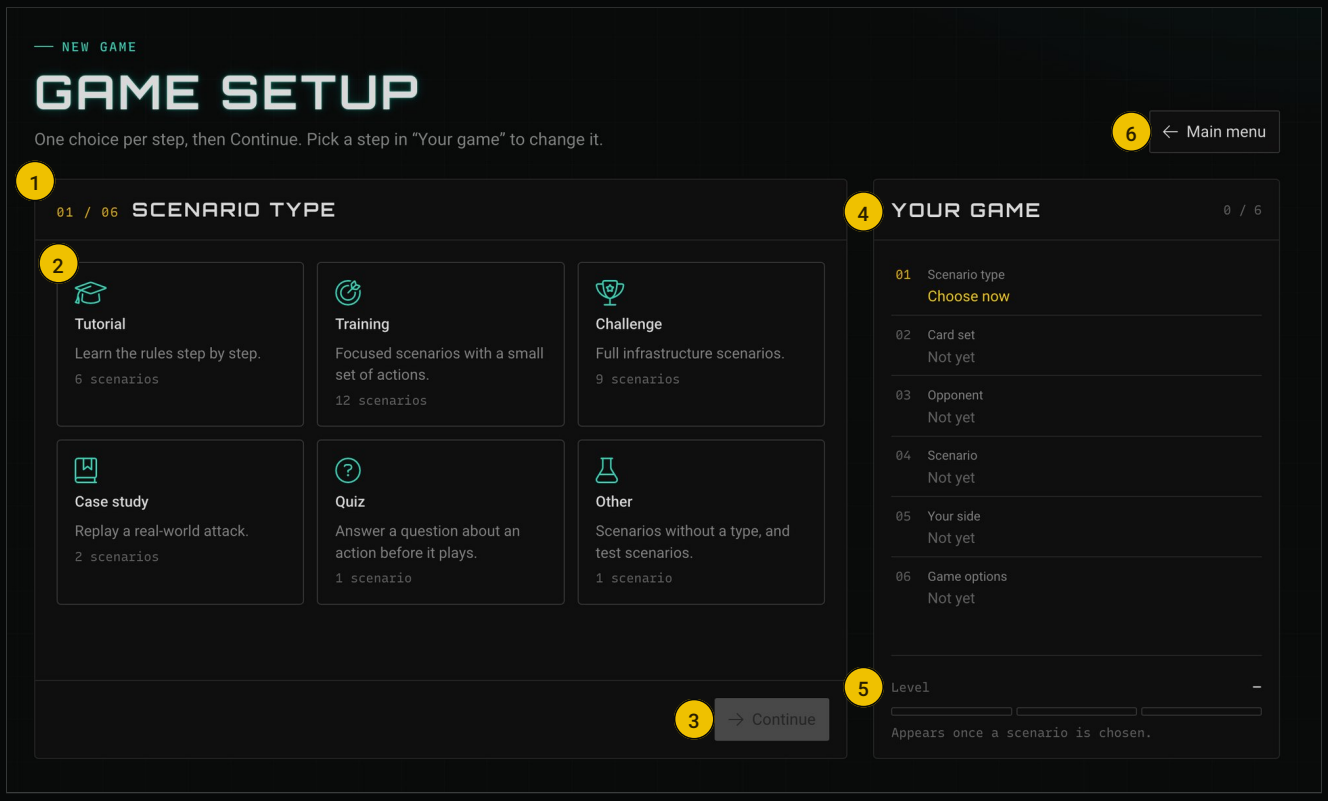


FIGURE 3.1 Game setup, step 1: the scenario type.

1. **Current step** – number and name of the step.
2. **Choices** – each tile shows how many scenarios it leads to.
3. **Continue** – goes to the next step once you have chosen.
4. **Your game** – your choices so far. Click a step here to change it.
5. **Level** – the estimated difficulty; appears once a scenario is chosen.
6. **Main menu** – leaves the setup.

01 **Scenario type**
Tutorial, Training, Challenge, Case study, Quiz or Other.

02 **Card set**
Which actions end up in the decks.

03 **Opponent**
A human, a bot or yourself.

04 **Scenario**
The infrastructure, story and goal.

05 **Your side**
Attacker or defender.

06 **Game options**
A rule preset or your own rules.

Each step only offers what fits your earlier choices. If only one choice is possible, PenQuest makes it for you.

3.1 SCENARIO TYPE

TYPE	WHAT IT IS
Tutorial	Learn the rules step by step.
Training	Focused scenarios with a small set of actions.
Challenge	Full infrastructure scenarios.
Case study	Replay a real-world attack, for example Mirai or Stuxnet. You attack, a bot defends.
Quiz	Answer a question about an action before it plays.
Other	Scenarios without a type, and test scenarios.

TABLE 3.1 Scenario types.

3.2 CARD SET

The card set decides which actions end up in the decks. Only the sets of scenarios of your chosen type are offered.

CARD SET	DESCRIPTION
Any	No filter. Every scenario brings its own set.
Standard `Default`	The full action set for the most realism, mapped to MITRE ATT&CK, D3FEND and NIST SP 800-53.
Fast	A small set for fast games with fewer actions.
Simplified	A simplified version of the Standard set with fewer actions.

TABLE 3.2 Card sets for challenge scenarios.

Tutorials, case studies and quizzes use their own actions; training scenarios use a selection of the Standard set.

3.3 OPPONENT

Human

> Both seats take players. The other player joins with the game code.

Bot

> Joins by itself. Choose `Easy` (plays at random) or `Hard` (plays smart).

Against yourself

> You take both seats in two browser tabs. The same scenarios are available as against a human.

The opponent decides which scenarios fit, because a scenario defines which seats can be played by a bot.

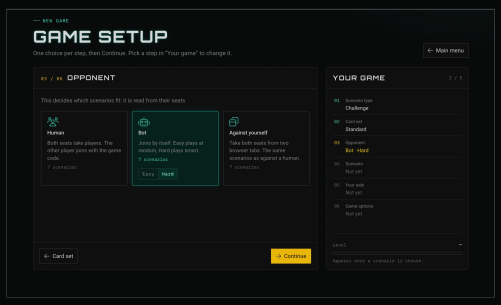


FIGURE 3.2 Step 3: a bot on level Hard.

3.4 SCENARIO

The list shows all scenarios that fit your choices; the line above it says how many. Each entry shows:

- **Level** – one to three diamonds: Easy, Medium or Hard.
- **Card set** – the set the scenario uses.
- **Description** – the size of the infrastructure and whether hidden assets are in play.

Click a scenario to select it. If it has alternative goals, choose an Objective: `Default`, an alternative goal, or `Random`. With Random, nobody knows the goal in advance.

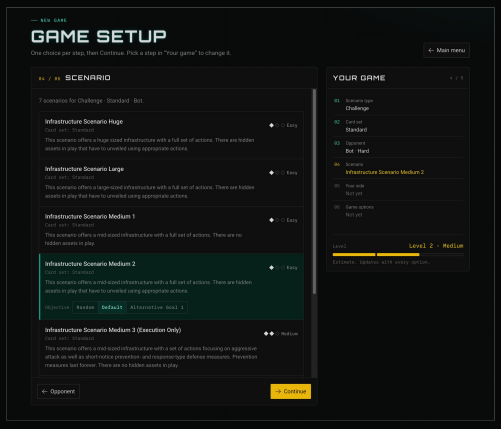


FIGURE 3.3 Step 4: the scenario list with objectives.

3.5 YOUR SIDE

Choose `Attacker` or `Defender`; your opponent gets the other side. Your actor and your goals follow in the mission briefing. Some scenarios allow only one side: in case studies you always attack.

3.6 GAME OPTIONS

Pick one preset. Each preset starts from the scenario's own options. The tag on each tile tells you what it does to the level: `Easier`, `Harder` or `Same as defaults`.

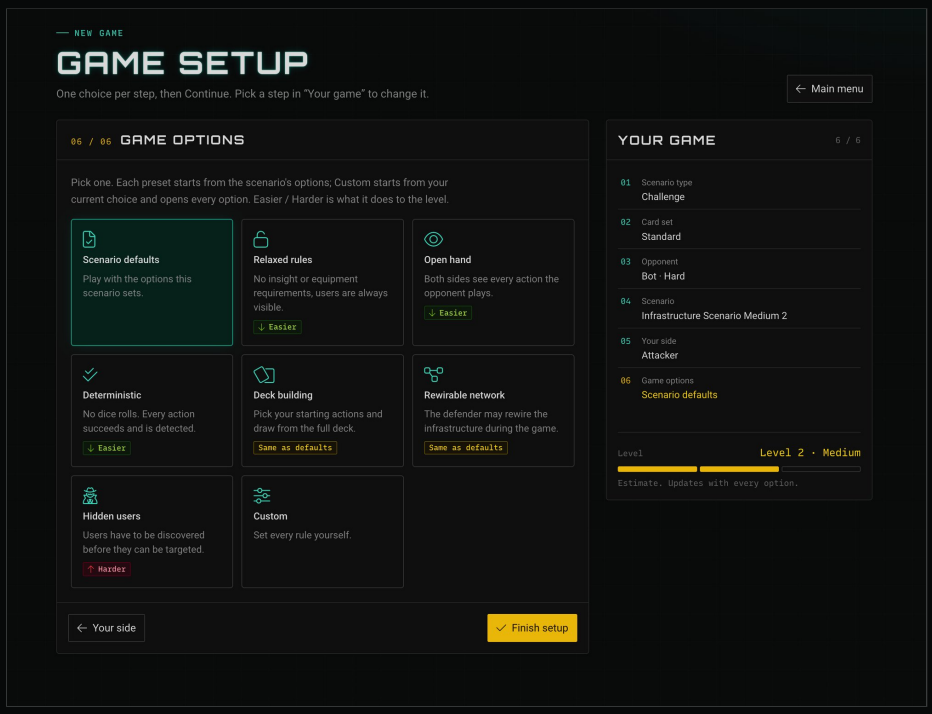


FIGURE 3.4 Step 6: rule presets.

PRESET	EFFECT
Scenario defaults	Play with the options the scenario sets.
Relaxed rules	No Insight or equipment requirements; users are always visible.
Open hand	Both sides see every action the opponent plays.
Deterministic	No dice rolls. Every action succeeds and is detected.
Deck building	Pick your starting actions and draw from the full deck.
Rewirable network	The defender may rewire the infrastructure during the game.
Hidden users	Users have to be discovered before they can be targeted.
Custom	Set every rule yourself. Starts from your current choice and opens every option.

TABLE 3.3 Rule presets.

All single rules and their defaults are listed in Appendix A. Some scenarios set all options themselves; then there is nothing to choose. Tutorials and case studies have no game options.

Custom rules

With **Custom**, all single rules open below the presets, grouped into Board and setup, Cards, Requirements, Resolving actions, Detection and visibility, and Quiz. Each rule has a short explanation; the default value is marked “(default)”. **Reset to the scenario's defaults** undoes your changes.

Quiz settings

Quiz questions can be added to any game in the Quiz group of the custom rules:

- Quiz – Off by default. Either the answer decides whether an action succeeds, or a right answer raises its success chance.
- Quiz difficulty – how hard the questions are.
- Question type – questions about the action played, general security questions, or both.

How a question looks in the game is shown in Quiz questions.

> ⓘ Most quiz questions were generated with an AI language model. Answers can be wrong. If you find a mistake, tell the PenQuest team.

3.7 DIFFICULTY AND FINISHING THE SETUP

Once a scenario is chosen, **Your game** shows an estimated level: Level 1 · Easy, Level 2 · Medium or Level 3 · Hard. The estimate updates with every choice. How it is calculated is still being worked out, so treat it as a rough guide.

The waiting room

When all steps are done, click Finish setup. The waiting room opens.

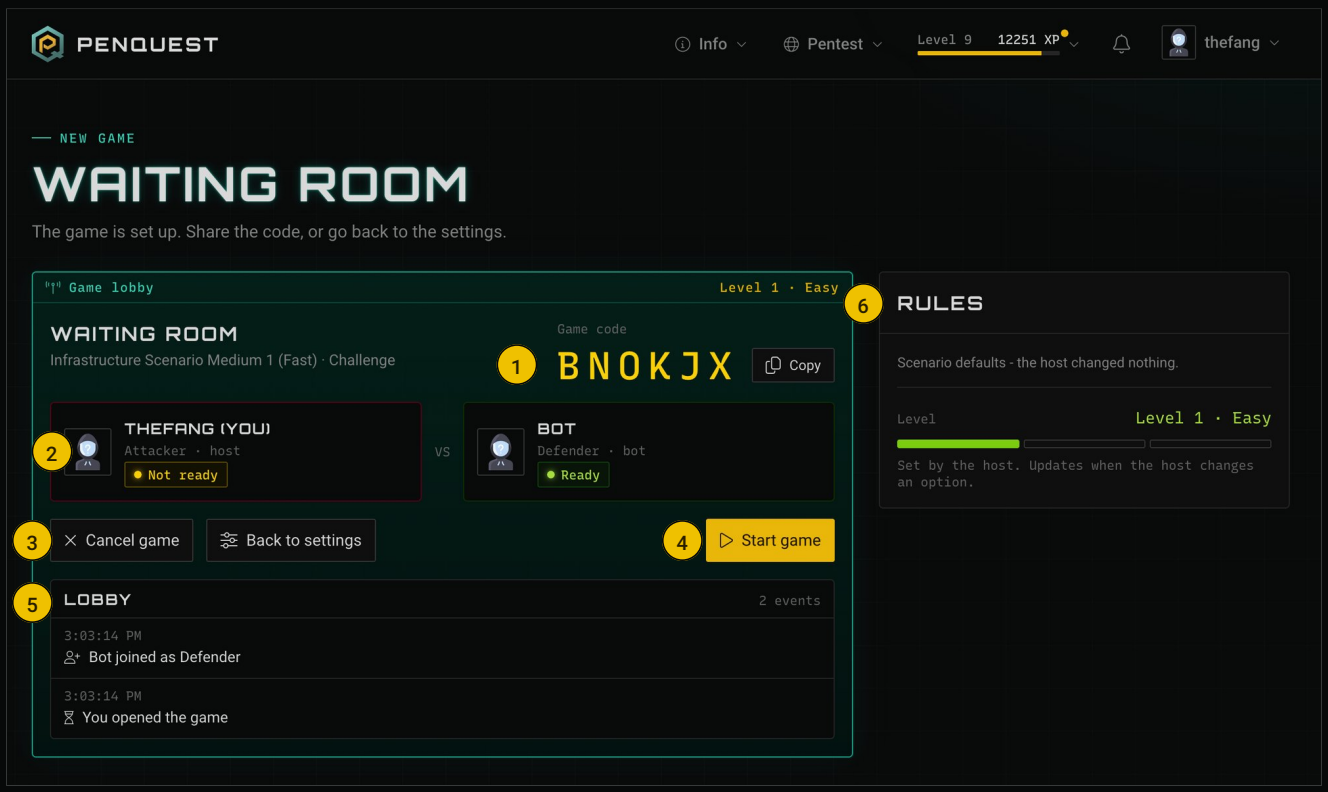


FIGURE 3.5 The waiting room of a game against a bot.

1. **Game code** – send it to the other player; **Copy** copies it.
2. **Players** – both sides with their status Ready or Not ready. A bot is ready at once.
3. **Cancel game** closes the game; **Back to settings** opens the steps again.
4. **Start game** – marks you as ready. The game starts when both players are ready.
5. **Lobby** – a log of what happened, for example who joined.
6. **Rules** – the rule preset the host chose and the level. It updates when the host changes an option.

After the start, each player sees their own mission briefing (chapter Mission briefing).

CHAPTER 04

JOINING A GAME

Find an open game or join with a game code.

Open **Main menu** › **Join game**. The page lists the games that are waiting for a second player. You can also join directly with a game code.

4.1 OPEN GAMES

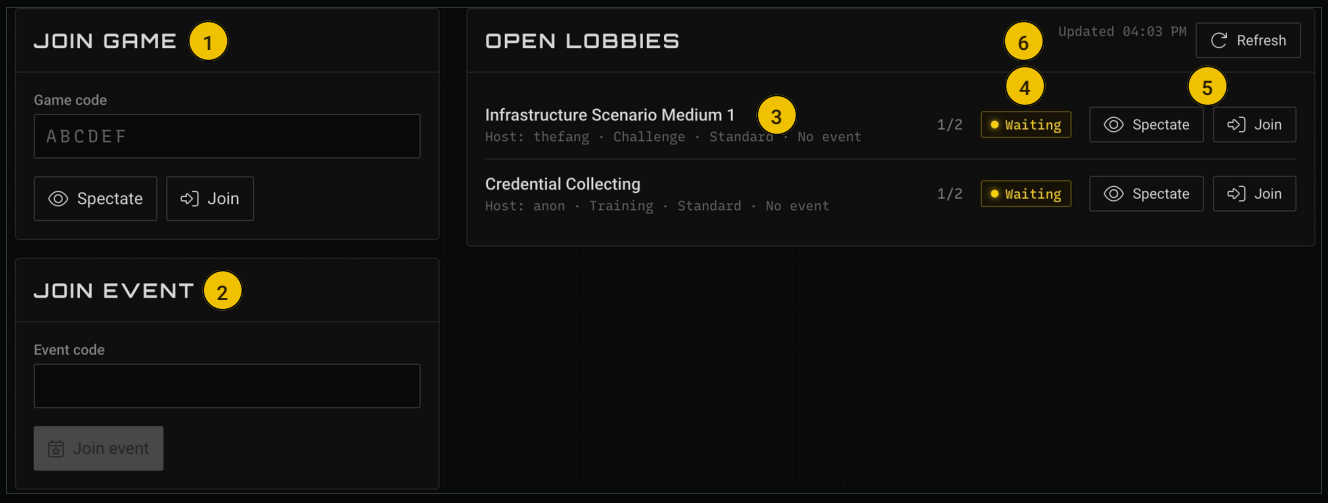


FIGURE 4.1 The open games page.

1. **Join game** – enter the six-letter game code you got from the host.
2. **Join event** – enter an event code; see Events.
3. **Game** – scenario, host, scenario type, card set and event.
4. **Status** – players in the game and Waiting or Running.
5. **Join** takes the free side; **Spectate** lets you watch.
6. **Refresh** updates the list.

Joining with a game code

01 **Get the code**
The host finds it in the waiting room.

02 **Enter it**
Type the code under Game code.

03 **Join**
Click **Join**. You enter the host's waiting room and get the side the host left free.

If the code is wrong or the game is already full, a message below the field tells you so.

4.2 CHECKING THE SETTINGS

As a joining player, you see the host's choices but cannot change them. The **Rules** panel in the waiting room (figure 3.5) shows the scenario, the presets and the level, and updates whenever the host changes an option. If you do not agree with the settings, talk to the host before you start.

When you are ready, click Start game. The game starts as soon as both players are ready. You then get your own mission briefing.

4.3 EVENTS

Events are time-limited challenges, for example a workshop or a course session. Games played in an event count towards the event's own high score, so an event can have a clear winner.

- **With an event code:** on the open games page, open **Join event**, enter the code you got from the organizer and click Join event.
- **With an invitation:** open the notifications in the header bar and click Accept.

After joining an event, you can set up and join games inside it. Joining an event game without having joined the event shows an error message.

CHAPTER 05

MISSION BRIEFING

Your role, your goals and your attributes before the game starts.

After the start, each player sees a briefing for their own side. It tells you who you are, what you have to do and what you can do it with. Your opponent's goal stays hidden.

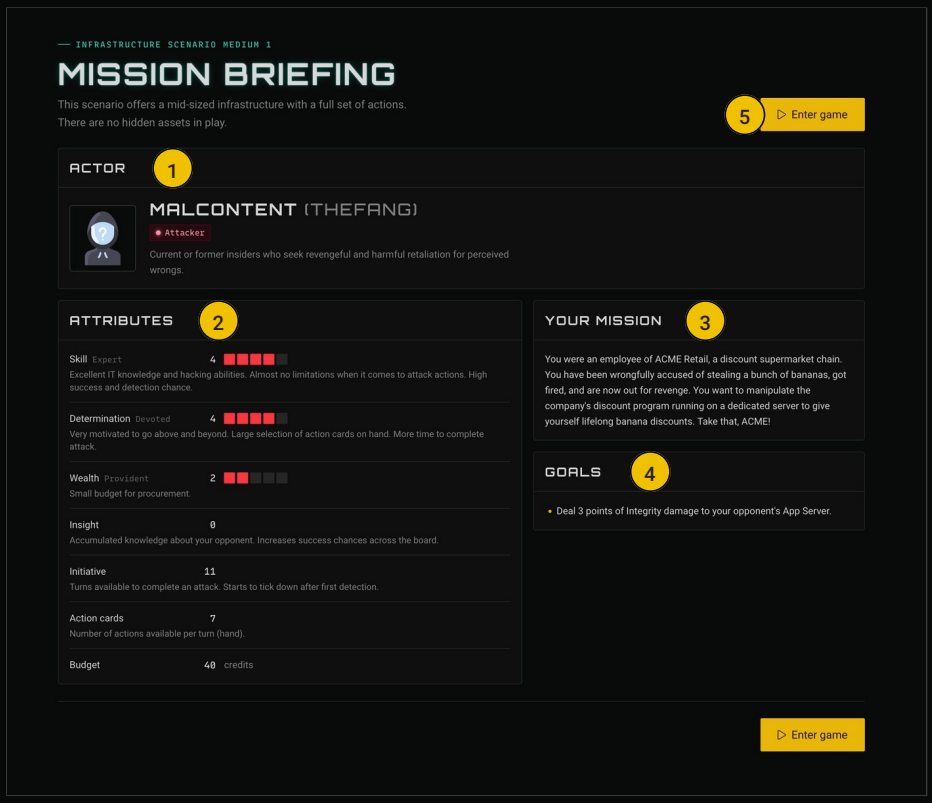


FIGURE 5.1 The mission briefing for the attacker.

1. **Actor** – your role in the scenario and your side.
2. **Attributes** – your values for this game.
3. **Your mission** – the story behind the scenario.
4. **Goals** – what you must achieve, in game terms.
5. **Enter game** – opens the game board.

5.1 STORY AND GOALS

The text under **Your mission** sets the scene. In the example you play Malcontent, a fired employee of a supermarket chain who wants revenge. The defender plays Retailer, the company.

Goals is what counts. Here the attacker must deal 3 points of Integrity damage to the App Server. The defender's goal is always to stop an opponent whose objective they do not know.

The line under the title says whether some assets are hidden at the start. When you are ready, click **Enter game**. You can open the same information on the board later with **Game Info**.

5.2 ATTRIBUTES

Every actor has three attributes from 1 to 5: **Skill**, **Motivation** and **Resources**. They decide how many turns, cards and credits you have.

> ⓘ The briefing still uses the old names: **Determination** for Motivation, **Wealth** for Resources and **Initiative** for Turns.

Skill

> IT security knowledge. Allows more advanced actions and adds to success and detection chances.

Motivation

> Willingness to go the extra mile. Gives the attacker more turns and gives both sides more cards.

Resources

> Money for equipment.

Insight

> Knowledge about the opponent, starting at 0. It raises success chances and is required by some actions.

Turns

> Attacker only: turns available to reach the goal. They only start to count down after the defender detects you for the first time.

Action cards

> Number of actions in your hand.

Budget

> Credits for the equipment shop.

```
Turns = Motivation + Skill + ⌊Assets ÷ 3⌋
```

Attacker only. ⌊ ⌋ means rounded down.

```
Cards = 3 + round(0.5 × Skill + 0.5 × Motivation)
```

Rounded half to even (2.5 → 2, 3.5 → 4).

```
Budget = 20 × Resources
```

Example: in Infrastructure Scenario Medium 1 (10 assets), Malcontent has Skill 4, Motivation 4 and Resources 2. That gives 4 + 4 + 3 = 11 turns, 3 + 4 = 7 cards and 40 credits.

> SKILL BONUS
> Each skill point above an action's skill requirement adds 5 % to its success chance.

CHAPTER 06

PLAYING THE GAME

The board, a turn, and how actions work.

Each player sees the board from their own side. You play actions on the assets of the infrastructure, buy equipment and watch the history for signs of your opponent.

6.1 THE BOARD AT A GLANCE



FIGURE 6.1 The game board from the attacker's side.

1. **You** – name, level and side. **Game Info** opens the scenario, your goals and your attributes.
2. **Opponent** – name, level, side and online status.
3. **Attacker** – the red tile is the outside world, where every attack starts.
4. **Asset** – a system of the infrastructure. Arrows show which assets can be reached from where.
5. **History** – every event of the game, grouped by turn. Expand an entry for details.
6. **Turn and status** – turn counter, whether you are detected, what to do next and the main button (**End Turn**, **Draw Cards** …).
7. **Hand** – your actions and equipment. The tabs on the left count support actions and actions; the blue tabs count equipment.
8. **Inventory bar** – search, **Buy Equipment**, your credits, Insight and Action Points.

Below the turn status are three more buttons: **Library** opens the card library, **Surrender** gives up the game, and **Save & Exit** leaves the game so you can continue later.

> Use the mouse wheel over the board to zoom. If elements overlap, set your display scaling to 100 % or zoom out in the browser.

Assets

Each asset tile shows its name and type, a damage gauge for Confidentiality, Integrity and Availability (C, I, A), and the effects that currently protect it, for example a shield. The small icons in the top left corner show how far the attacker has got on this asset: `Reconnaissance` (eye), `Initial access` (key) and `Execution` (wrench). A person icon marks an asset with users.

- **Connections** – an arrow means the attacker can move from one asset to the next. Dotted lines allow only certain attacks.
- **Groups** – a large frame such as DMZ or LAN is an asset that contains other assets, for example a network segment. Attacking the outer asset usually affects the ones inside.
- **Hidden assets** – in some scenarios, assets must be discovered before they can be attacked.

6.2 A TURN STEP BY STEP

A game follows a fixed loop. Steps 1 and 2 happen once at the start; steps 3 to 6 repeat until the game ends.

01 **Defender set-up (optional)**
If the option is active, the defender plays some actions for free to build a security baseline.

02 **Pick your starting hand**
With deck building (the default), both players choose their first actions in the **Draw Actions** window.

03 **The attacker plays actions**
The defender may detect them.

04 **The defender plays actions**
The attacker learns about some of them (by default only responses).

05 **Both players draw cards**
Every played card is replaced, so your hand is full again.

06 **Next turn**
The attacker starts again. Both players can buy equipment at any time.

The defender receives a small income of credits each turn. The attacker has to manage with their budget or earn money through certain attacks.

Drawing actions

When you may draw, the turn panel says Pick new actions. Click **Draw Cards** to open the Draw Actions window.

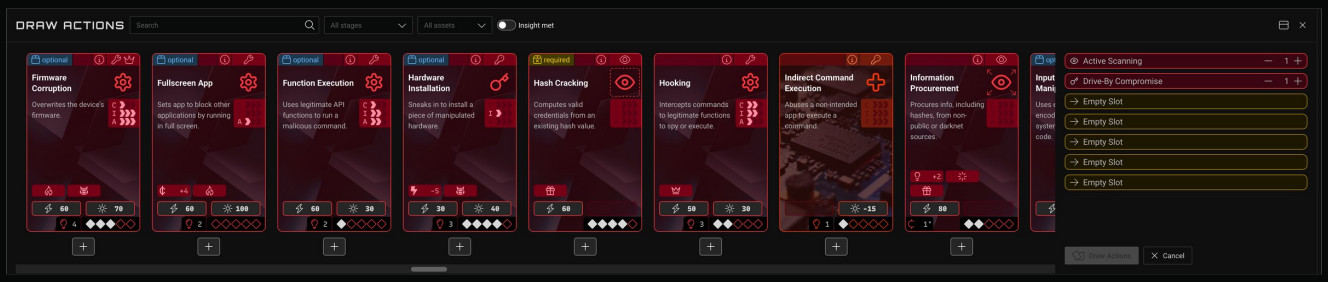


FIGURE 6.2 The Draw Actions window at the start of a game.

- **Top bar:** search by name and filter by attack stage and asset type. Insight met shows only actions whose Insight requirement you already meet.
- **Cards:** click + below a card or drag the card into the selection on the right. Scroll sideways for more.
- **Selection** (right): one slot per free card in your hand; − and + change the number of copies.
- Draw Actions takes the selection into your hand; Cancel closes the window.

A card you play during a turn leaves an empty slot marked Draw Action next Turn in your hand.

Action Points

Every action costs 1 to 5 Action Points (AP). AP represent the time an action takes. One turn is worth 3 AP. An expensive action may borrow up to 2 AP from the next turn, which then has fewer AP left. The diamonds in the inventory bar show your available AP; a card's diamonds show its cost.

> EXAMPLE
> You play a 5-AP action in turn 1. It uses the 3 AP of turn 1 and 2 AP of turn 2. In turn 2 you have only 1 AP left.

When you have played what you want, click End Turn. If your AP are not full, you can click Skip Turn to wait a turn and refill them.

Discarding actions

If you want to change your strategy, you can throw away actions you no longer need and pick new ones instead.

01 **Drag the card**
Drag an action from your hand. A field Drop here to discard – costs 1 AP appears.

02 **Drop it**
Drop the card on that field. It leaves your hand and costs 1 Action Point.

03 **Pick new actions**
The free slot is refilled the next time you draw actions.

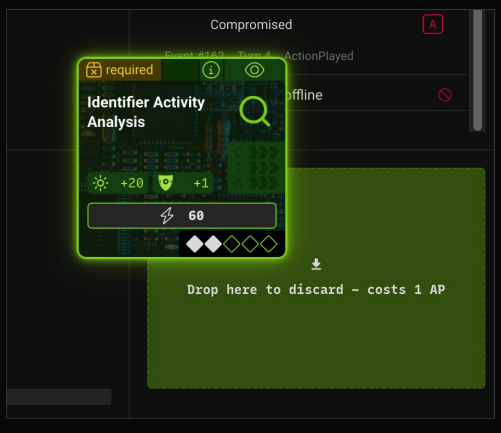


FIGURE 6.3 Discarding an action.

6.3 ACTIONS

Attack actions belong to one of three stages: `Reconnaissance` `Initial access` `Execution`. Only attackers have `Support actions`. Defense actions are `Detection`, `Prevention` or `Response`.

Reading a card



1. **Attack stage** – eye, key or wrench.
2. **Name and description**. The large icon shows the kind of action.
3. **Damage** – how many points of C, I and A damage the action can deal. Defense cards show healing here.
4. **Effects** – one icon per effect, for example item gathering or +1 Insight. The table below lists all effects.
5. **Success chance** in percent. Equipment, Insight, Skill and your opponent can change it.
6. **Detection chance** in percent: how likely the defender notices the action.
7. **Insight requirement** – Insight points you need to play the card.
8. **Action Points** – filled diamonds are the AP cost.

FIGURE 6.4 An attack card: Keylogging.

In your hand, cards also show a tag in the top left corner: required means the action needs a piece of equipment you must own; optional means compatible equipment can improve it. Click ⓘ on a card to see all details in the card library.

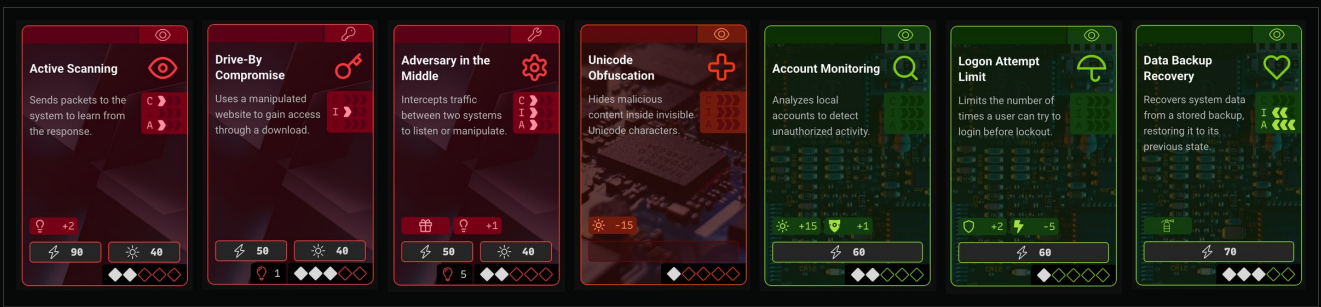


FIGURE 6.5 From left: Reconnaissance, Initial access and Execution attacks, a support action (orange), and Detection, Prevention and Response defenses.

Attack stages

The attacker has to work through the stages on each asset. An action of the next stage can only be played after an action of the previous stage succeeded on that asset.

STAGE	PURPOSE
Reconnaissance	Gather information about the asset or the organization.
Initial access	Get into the asset and establish a foothold.
Execution	Cause damage and reach the goal.

TABLE 6.1 Attack stages.

Support actions are not played on their own. You add them to a main action, which then gets their bonuses, for example to avoid detection.

Defense types

TYPE	PURPOSE
Detection	Raises the chance to detect certain attacks, for one or several turns.
Prevention	Puts a shield on an asset that blocks 1 to 3 damage points of matching attacks.
Response	Heals damage the attacker has already dealt.

TABLE 6.2 Defense types.

> As defender, start with a mix of detection and prevention.

Playing an action

Drag a card from your hand onto an asset. While you drag, matching assets light up; assets the card cannot target show Asset type mismatch. Untargeted actions and actions that hit several assets at once can be dropped anywhere on the board.

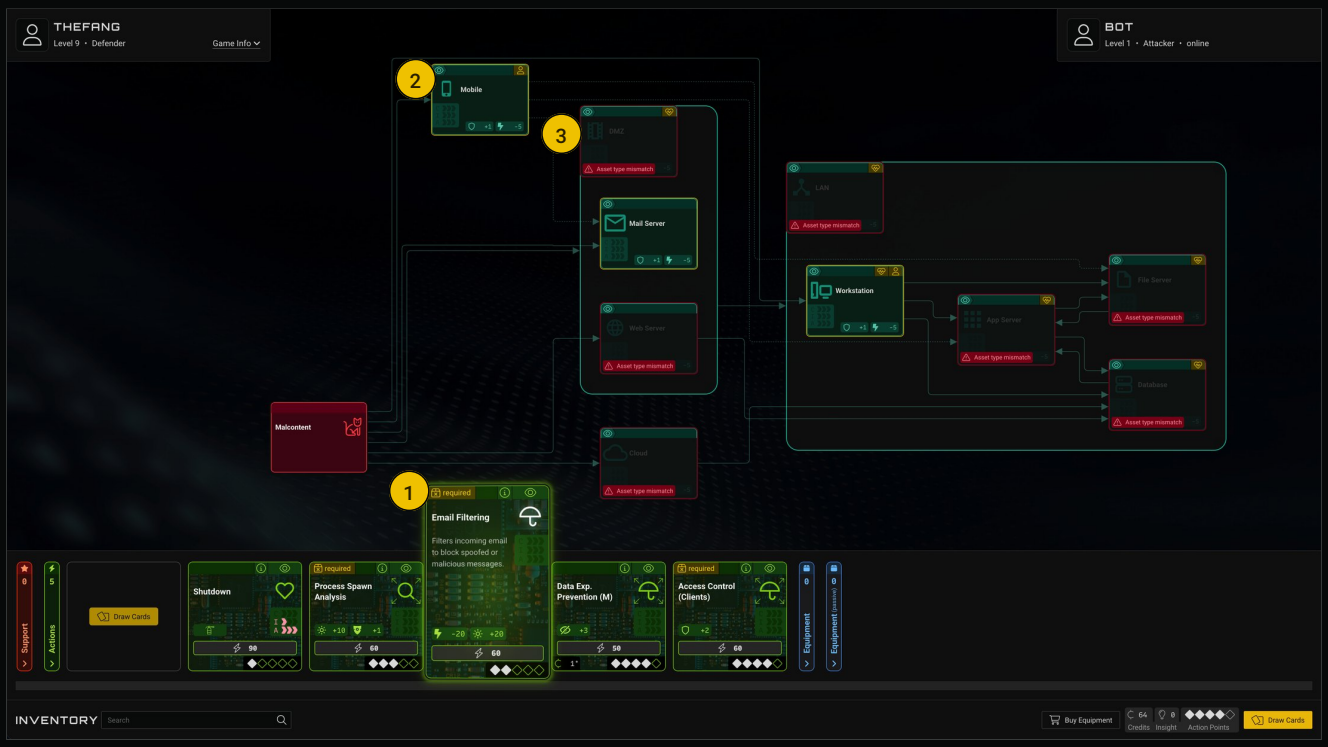


FIGURE 6.6 Dragging a defense card: matching assets light up.

1. The card you drag.
2. A matching asset, outlined in yellow.
3. An asset of the wrong type.

When you drop the card, the **Prepare Action** window opens.

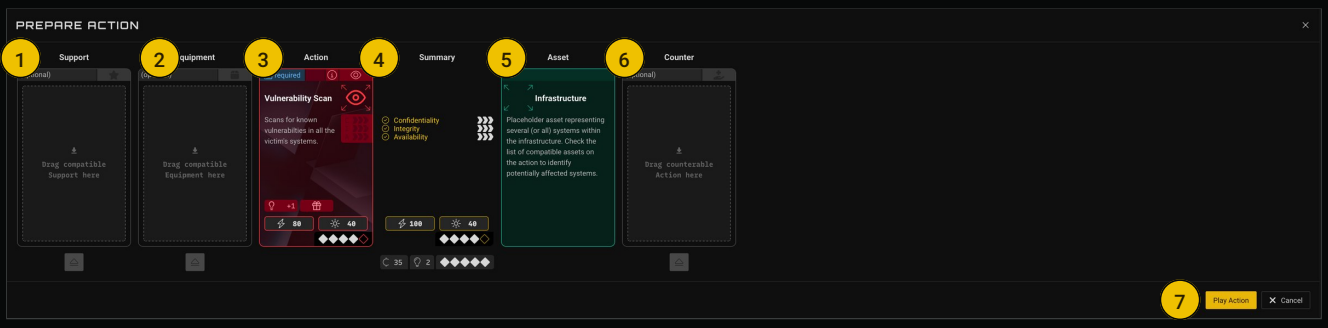


FIGURE 6.7 The Prepare Action window for a multi-target attack.

1. **Support** – optional; drag a compatible support action here.
2. **Equipment** – optional; drag compatible equipment from your hand here.
3. **Action** – the card you play.
4. **Summary** – the damage types to deal and the resulting success and detection chance, plus the cost in credits, Insight and AP.
5. **Asset** – the target. For multi-target actions this is Infrastructure, which stands for all matching assets.
6. **Counter** – optional slot for a counterable action.
7. **Play Action** plays the card; **Cancel** returns it to your hand.

Some actions deal no damage or have their damage type fixed. Defense actions are played the same way.

Quick buy

If an action needs equipment you do not have, or could be improved by equipment, you can buy it without leaving the action. Click the cart icon next to the required or optional tag of the card, in the Prepare Action window or in your hand. A small **Equipment Shop** opens with only the matching items and their prices. Click Buy; the item goes straight to your inventory and can be used for the action.

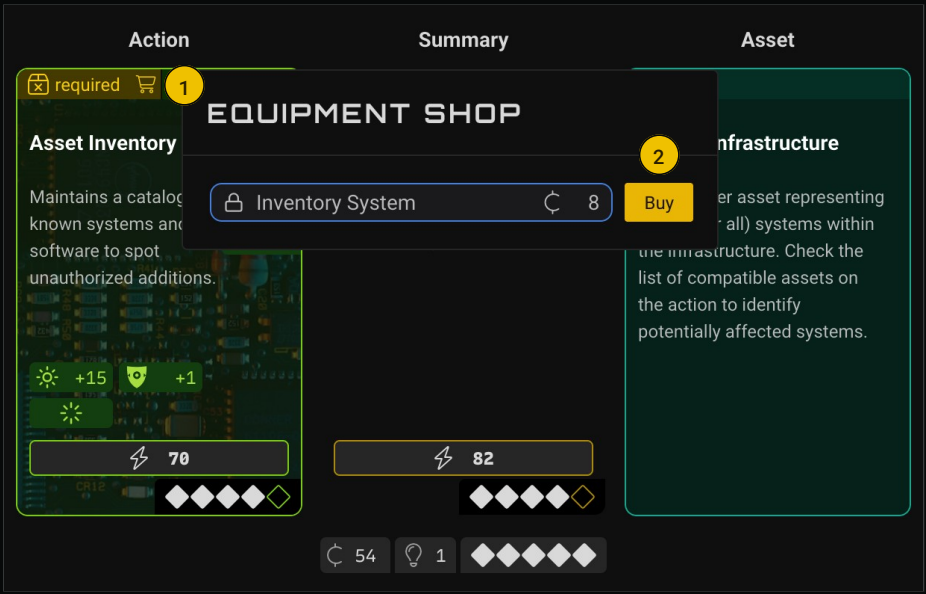


FIGURE 6.8 Quick buy in the Prepare Action window.

1. The cart icon on a card that requires equipment.
2. The matching item with its price in credits and Buy.

Quiz questions

If the quiz is switched on, a question appears when you play an action. Pick an answer and click Submit answer before the timer runs out. Depending on the game options, your answer decides whether the action succeeds or raises its success chance.

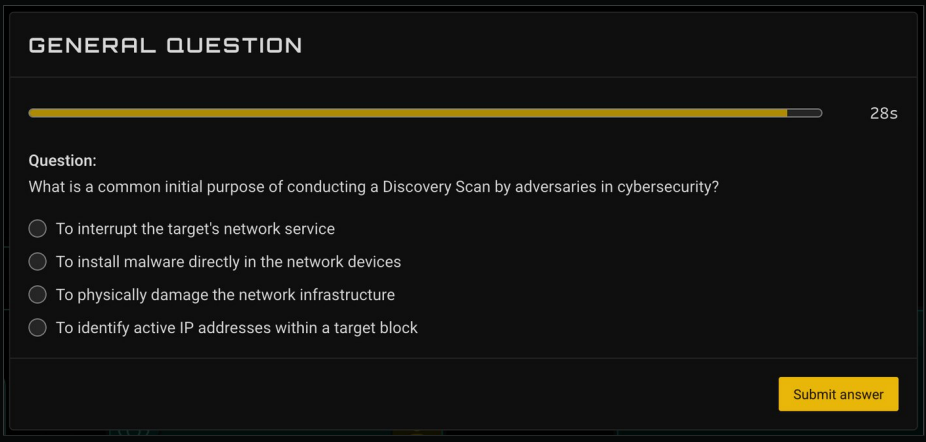


FIGURE 6.9 A general quiz question with the timer above it.

Effects

EFFECT	WHAT IT DOES
BOTH SIDES	
Insight gain	Grants Insight points.
Success boost / penalty	Raises your success chance or lowers your opponent's.
Item gathering	Chance to get equipment such as credentials, exploits or fixes.
Cost	The action costs credits, possibly per affected asset. Without enough credits it fails.
ATTACK	
Detection penalty	Lowers the defender's detection chance.
Discovery	Reveals hidden assets that can be reached.
Privilege escalation	Grants admin rights on the asset, which some attacks need.
Permanent access	Creates a direct path from outside to the asset.
Persistence	Deals the damage again every turn until removed or healed.
Income	Increases the attacker's credits.
DEFENSE	
Detection boost	Raises the detection chance for some turns.
Reactive Insight gain	Grants Insight when an attack is detected with this action, once per asset.
Shield	Absorbs damage of matching attacks; often has a chance to trigger.
Remove persistence	Stops recurring damage.
Remediate privilege escalation	Removes the attacker's admin rights.
Revoke credentials	Makes the attacker's credentials for this asset useless. The attacker finds out only when using them.
Remediate vulnerability	Makes known exploits for this asset useless, also unnoticed.
Insight prevention	Blocks future Insight gain of the attacker.
Clone asset	Creates a decoy copy of an asset. It is uncovered after 3 Confidentiality damage. Each asset can be cloned once.

TABLE 6.3 Card effects.

6.4 INSIGHT, EQUIPMENT AND ASSETS

Insight

Insight is what you know about your opponent. It starts at 0. Each point raises your success chances, and many advanced actions require a minimum Insight. You gain Insight through actions, through equipment such as analysis tools, and, as attacker, by stealing data: 3 Confidentiality damage on an asset gives 1 Insight.

Equipment

Equipment cards are blue. Some actions require a certain item (any one of the listed items is enough); others are only improved by compatible equipment. Equipment can also have effects of its own.

- **Passive equipment** (tab Equipment (passive)) works on its own whenever you play a matching action.
- **Other equipment** (tab Equipment) must be added in the Prepare Action window. Some items belong to one asset, for example an exploit For: Mail Server.



FIGURE 6.10 From left: attack tool, security system, policy, analysis tool, credentials, exploit, fix.

TYPE	SIDE	WHAT IT DOES
Attack tools	Attack	Permanent bonuses, for example scanners and cracking tools.
Security systems	Defense	Permanent bonuses, for example firewalls or antivirus.
Policies	Defense	Expensive, permanent; large bonuses and enable organization-wide actions.
Malware	Attack	One-time; added to an attack, for example ransomware for income or spyware for Insight.
Analysis tools	Defense	One-time; help to understand an attack and generate Insight.
Credentials	Attack	Access an asset with a valid account. The defender can revoke them.
Exploits	Attack	Knowledge of a vulnerability in an asset; required by the “Exploit (…)” actions. Last until fixed.
Fixes	Defense	Required to remove exploits; give lasting bonuses.

TABLE 6.4 Equipment types.

Buying equipment

Click **Buy Equipment** in the inventory bar at any time. The shop opens above your hand.

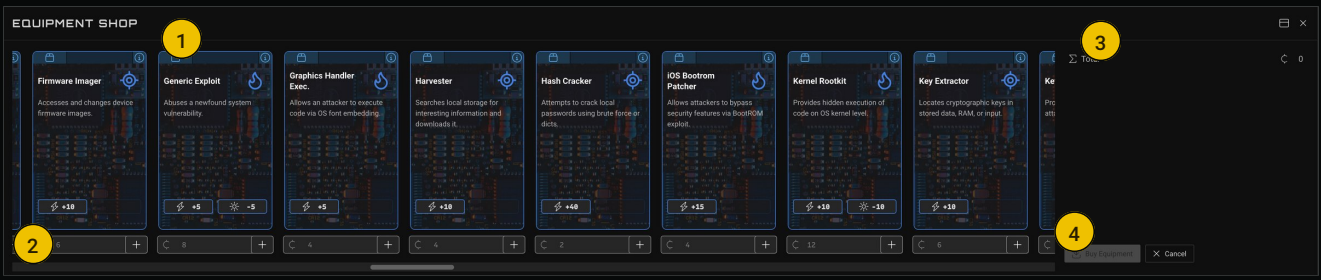


FIGURE 6.11 The equipment shop.

1. Equipment on offer; scroll sideways for more.
2. Price in credits; click **+** or drag the card into the cart on the right.
3. **Total** – your cart and its price.
4. **Buy Equipment** completes the purchase; **Cancel** empties the cart.

Selling equipment

Sell items you no longer need, or turn loot into money: as attacker, stolen credentials and exploits you generated can be sold for credits.

01 **Drag the item**
Drag an equipment card from your hand. A field Drop here to sell appears and shows how many credits you get.

02 **Drop it**
Drop the card on that field. A dialog shows the credits again and, for items with a lasting effect, that the effect ends.

03 **Confirm**
Click Sell, or Cancel to keep the item.

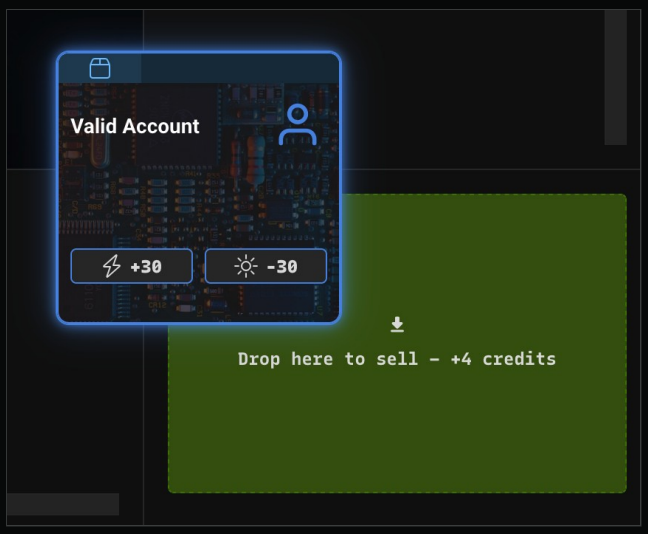


FIGURE 6.12 Dragging stolen credentials onto the sell field.

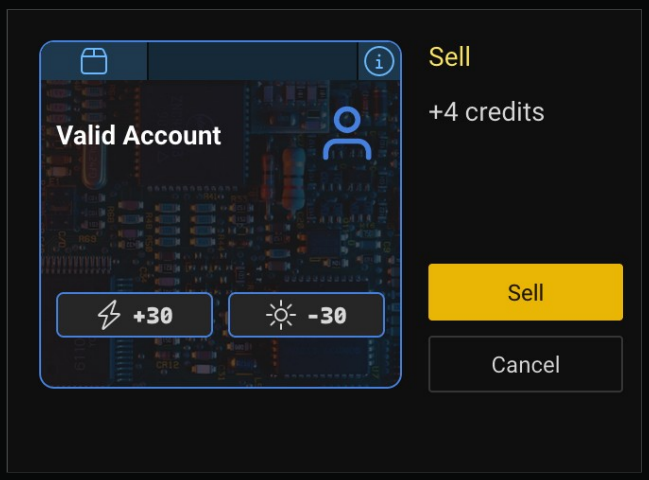


FIGURE 6.13 Confirming the sale.

6.5 DETECTION, DAMAGE AND SHIELDS

Detection

Detection happens on its own. Whether an attack is noticed depends on the action's detection chance, the defender's detection actions, equipment and attributes, and luck. Even failed attacks can be detected.

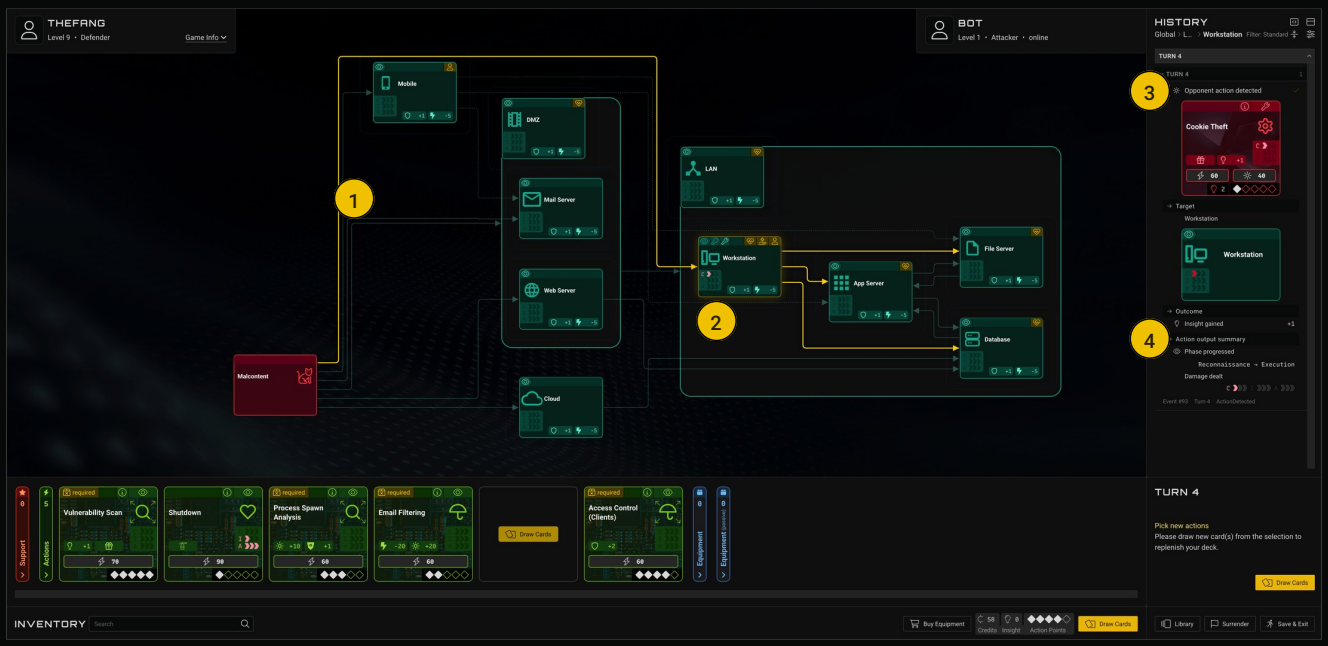


FIGURE 6.14 The defender has detected an attack on the workstation.

1. The attack path is highlighted from the attacker to the target.
2. The affected asset is animated and shows the new damage.
3. **Opponent action detected** – the action, its target and the outcome.
4. **Action output summary** – for example the stage reached and the damage dealt.

For the attacker, the status next to the turn counter changes from HIDDEN to DETECTED. The attacker's turns only start to count down after the first detection. Choosing quiet actions or support actions against detection can therefore win the game.

The attacker normally learns only about the defender's response actions. The game option Detectable defense actions can change this.

Damage

Damage follows the CIA triad. Each dimension goes from 0 to 3 points; 3 points means full compromise.

DAMAGE	STANDS FOR	AT 3 POINTS
Confidentiality	Data theft	All valuable data is stolen; the attacker gains 1 Insight.
Integrity	Manipulated data or configuration	The attacker takes over the asset and opens all connections leading from it.
Availability	Denial of service	The asset goes offline. Penalties for the defender may apply.

TABLE 6.5 Damage types.

Shields and healing

Prevention actions place shields on assets. A shield absorbs damage from matching attacks only. By default, shields do not deplete: a successful prevention protects for the rest of the game. With the option Shield effectiveness switched, shields expire or get used up. Response actions heal damage that has already been dealt.

6.6 WINNING AND LOSING

OUTCOME	WHEN
Attacker wins	The attacker reaches the goal before the turns run out.
Defender wins	The turns run out before the attacker reaches the goal.
Draw	The defender triggers an availability penalty by not restoring a vital system that went offline.
Inconclusive	A player surrenders before the end.

TABLE 6.6 Game outcomes.

At the end, both players see a game summary and the uncovered board with the real sequence of events. The summary lists all actions played and all damage dealt or prevented; click an action for details. Both players then receive experience points (XP).

> In a course or workshop, use the summary for a lessons-learned discussion.

Leaving and resuming

Save & Exit leaves the game without ending it. Closing the browser tab does the same. The main menu then shows which game is still open, with your scenario and role.

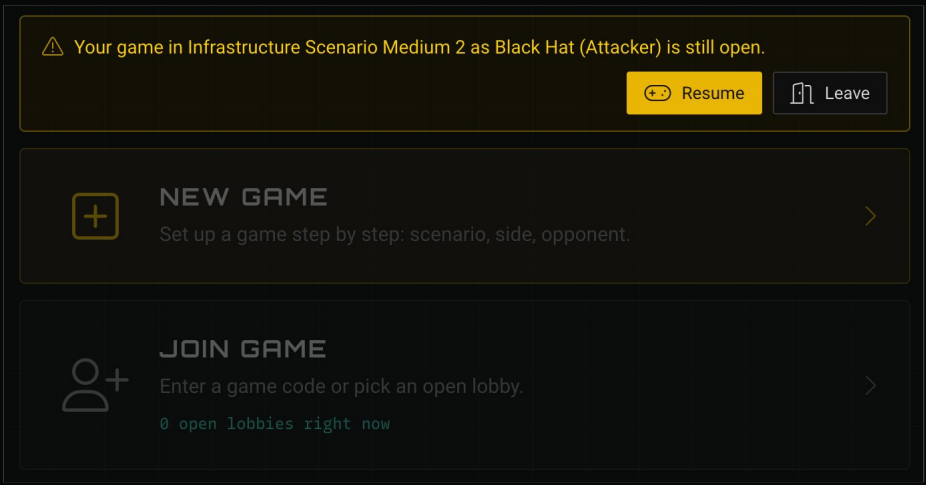


FIGURE 6.15 An open game in the main menu.

Click Resume to continue where you left off, or Leave to give up the game. You can keep only one game open at a time; until you resume or leave it, New game and Join game are greyed out.

> Surrender ends the game immediately. The server also closes games that have been left open for a long time.

CHAPTER 07

CARD LIBRARY

Browse, filter and compare actions outside a game.

The card library shows every action outside a game. Open it with **Main menu** › **Card library**, with **Library** on the game board, or with ⓘ on a card.

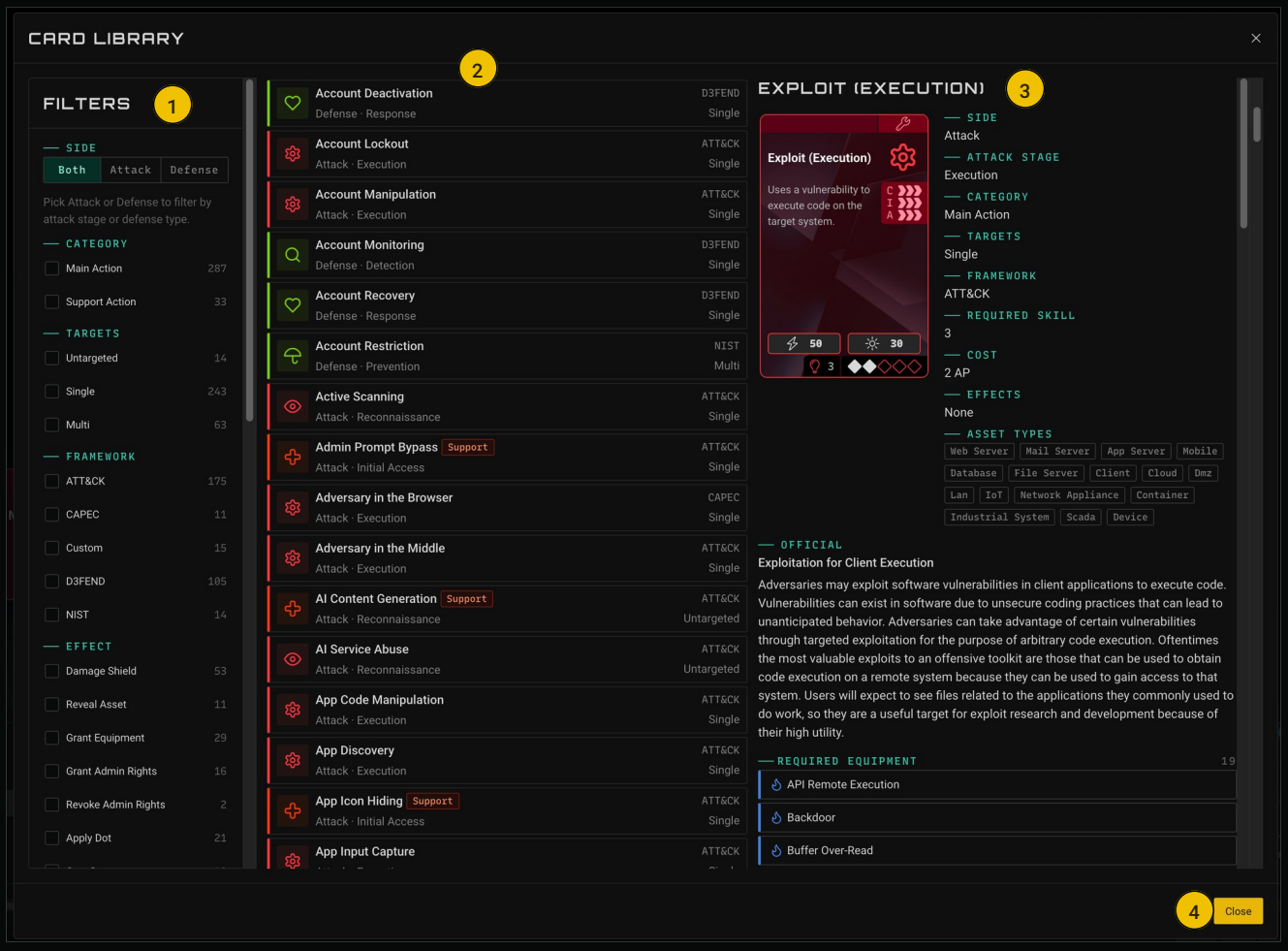


FIGURE 7.1 The card library: filters, list and details.

1. **Filters** – narrow the list down.
2. **List** – all actions that match the filters.
3. **Details** of the selected action.
4. **Close** returns to where you came from.

7.1 FINDING ACTIONS

Each entry in the list shows the action's icon and name, its side and its attack stage or defense type, the framework it comes from and its targets. Support actions carry an orange `Support` tag. Click an entry to show its details.

The filters on the left work together. The number next to each option tells you how many actions it matches.

FILTER	OPTIONS
Side	Both, Attack, Defense. Pick Attack or Defense to filter by attack stage or defense type.
Category	Main Action, Support Action.
Targets	Untargeted, Single (one asset), Multi (several assets).
Framework	ATT&CK, CAPEC, Custom, D3FEND, NIST.
Effect	Damage Shield, Reveal Asset, Grant Equipment, Grant Admin Rights, Revoke Admin Rights, Apply Dot, Cure Dot, Insight Prevention, Revoke Credentials, Remediate Exploits, Clone Asset, Reactive Insight Detection, Maintain Access, Modify Action Success Chance, Modify Action Detection Chance, Modify Action Detection Chance (Failed), Modify Actor Insight, Modify Actor Credits. “Dot” means damage over time (persistence).

TABLE 7.1 Card library filters.

7.2 ACTION DETAILS

The details show the card as it looks in the game, followed by its facts:

- side, attack stage or defense type, category and targets;
- framework and Required skill;
- Cost in Action Points and the card's effects;
- Asset types the action works on;
- Official – the name and description in the source framework, for example MITRE ATT&CK;
- Required equipment – any one of the listed items is enough.

Further down you find the compatible equipment and the counters. Attack actions list the defense actions they are detected by, prevented by and countered by. Defense actions list the attacks they detect, prevent or mitigate. Click a linked action to open it.

> Use the counters to plan: as attacker, check what can stop your next move; as defender, check which defenses cover the attacks you expect.

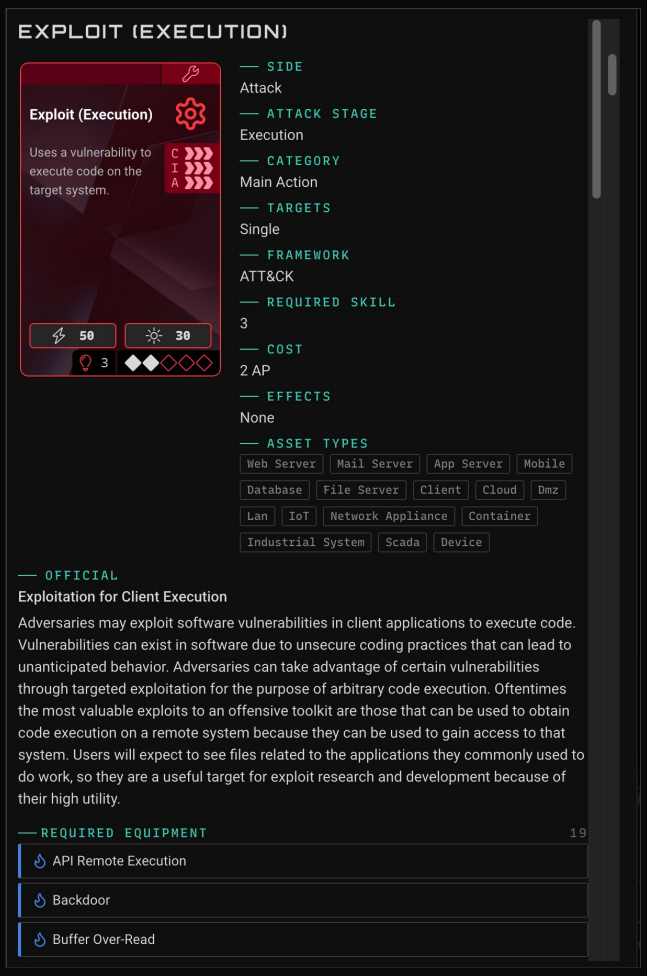


FIGURE 7.2 Details of an attack action.

CHAPTER 08

PROGRESS

XP, levels, high scores and achievements.

Every finished game earns you experience points (XP). Collect enough XP to reach the next level. Your level and XP are shown in the header bar and under **Your progress** in the main menu, together with the XP you still need for the next level.

Click your level in the header bar or `High scores and achievements` in the main menu to open the progress page. It has two tabs.

8.1 HIGH SCORES

The **Rankings** list all players with their level, games played, questions answered correctly and XP. Use the selector at the top right to switch between Global · all games and the ranking of an event you take part in. An event ranking counts only the games played at that event.

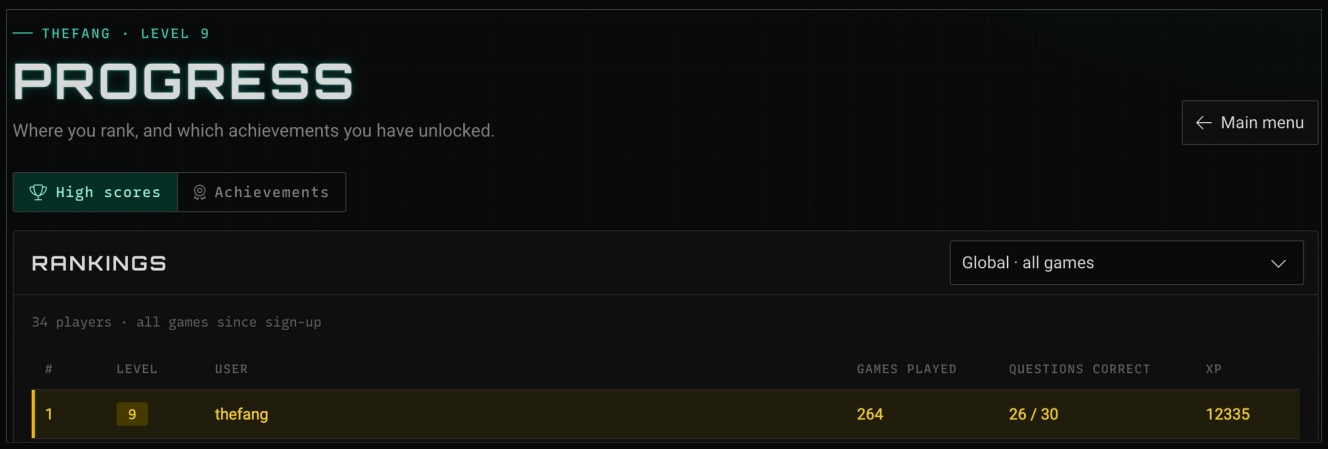


FIGURE 8.1 High scores, global ranking. Your own row is highlighted; the other rows are cut off here.

8.2 ACHIEVEMENTS

Achievements reward milestones, for example finishing your first tutorial. They are grouped into categories such as Progression and Milestones. The bar at the top shows how many you have unlocked. Unlocked achievements show the date you earned them; locked ones show a lock. Filter with `All`, `Unlocked` and `Locked`.

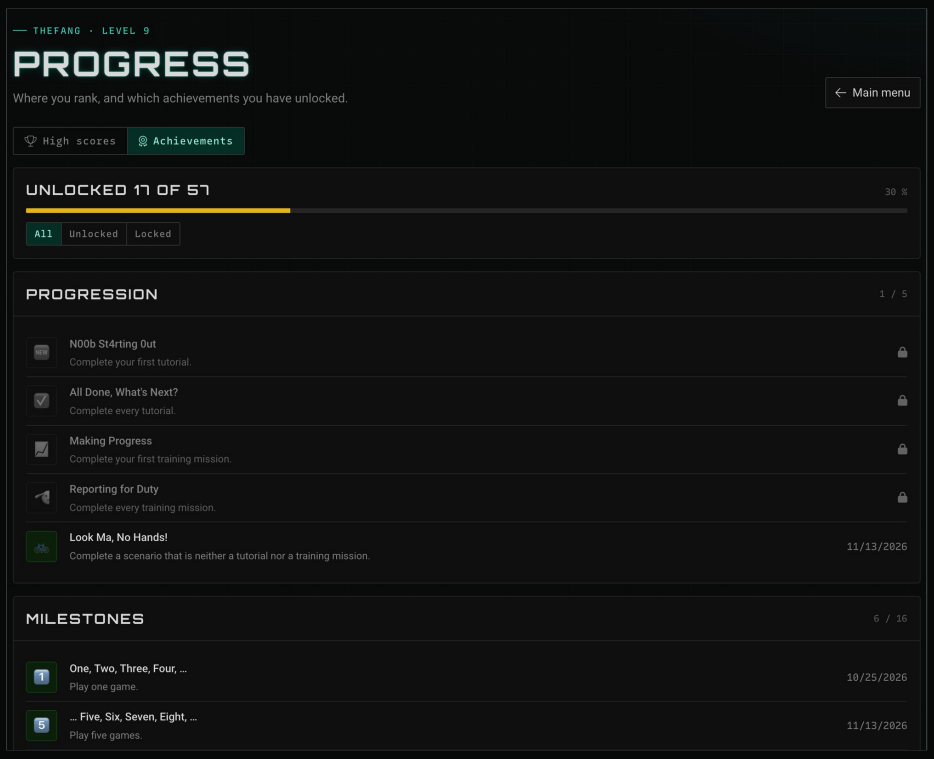


FIGURE 8.2 Achievements by category.

CHAPTER 09

ORGANIZATION ADMINISTRATION

Manage the users, groups and invitations of your organization.

> ⓘ This chapter is for instructors and organization admins. The main menu shows **Manage organization** only if you are an admin of the selected organization.

An organization is a closed group of players, for example a course or a company. Admins manage its members. Select the organization in the header bar, then click Main menu › Manage organization. The administration has four sections on the left.

9.1 OVERVIEW

The overview shows the organization's name, the number of users, groups and open invites, and three quick actions: **Create user**, **Invite existing user** and **Create group**. The numbers next to the sections on the left show the same counts.

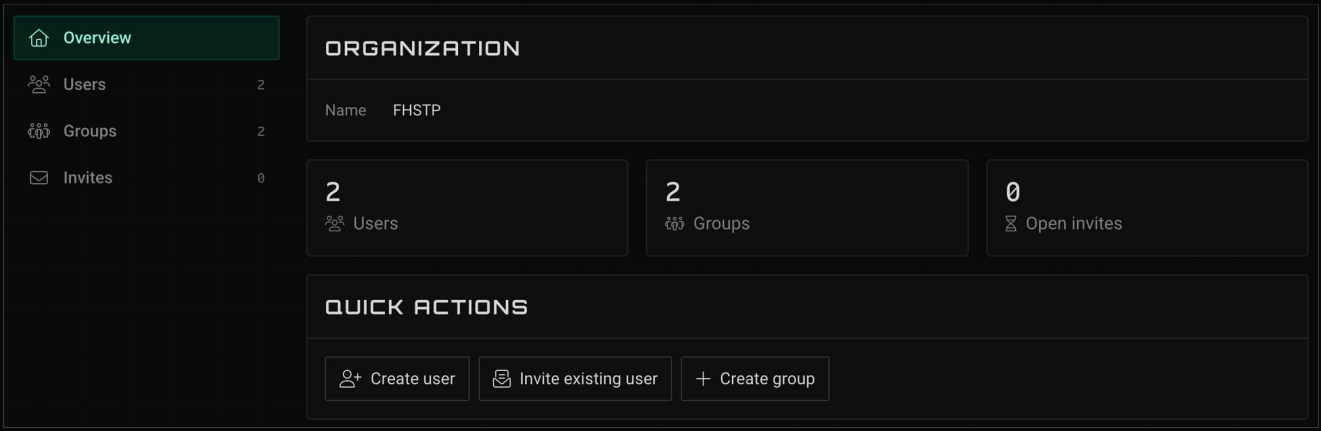


FIGURE 9.1 Administration overview.

9.2 USERS

The user list shows each member's username and role (for example Master or Member), e-mail address, groups, the date they joined and their last login. Search by name, e-mail or group.

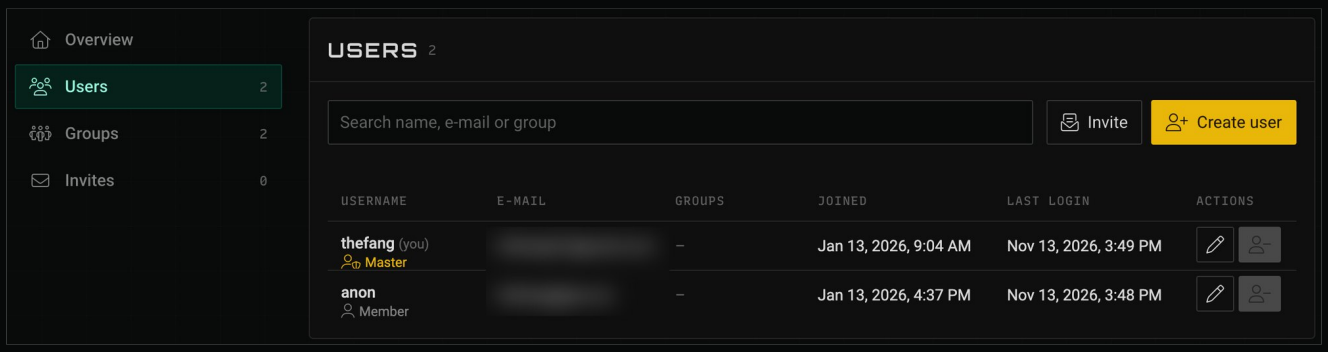


FIGURE 9.2 The user list. E-mail addresses are blurred here.

- **Create user** creates a new PenQuest account and adds it to the organization. The person gets an e-mail to set a password.
- **Invite** invites someone who already has a PenQuest account.
- Under **Actions**, the pencil button edits a user; the second button removes the user from the organization.

9.3 GROUPS AND INVITES

Groups sort users, for example by class or team. The list shows each group with its number of users and the date it was created. Click **Create group** to add one; the pencil and bin buttons edit and delete a group. Deleting a group keeps its users; they just lose the group.

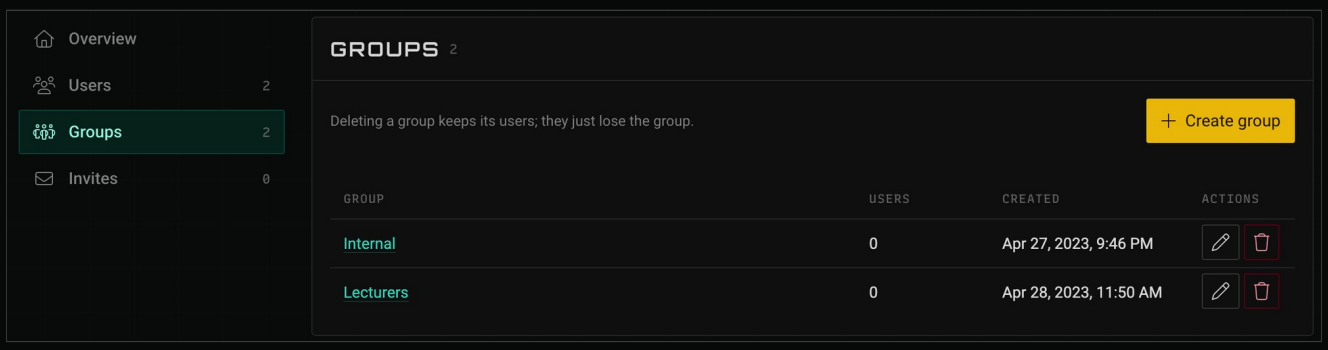


FIGURE 9.3 The group list.

Invites are for people who already have a PenQuest account; for new people, use **Create user**. Click **New invite** to invite someone. The list shows each invited user, the date and the status, for example Accepted.

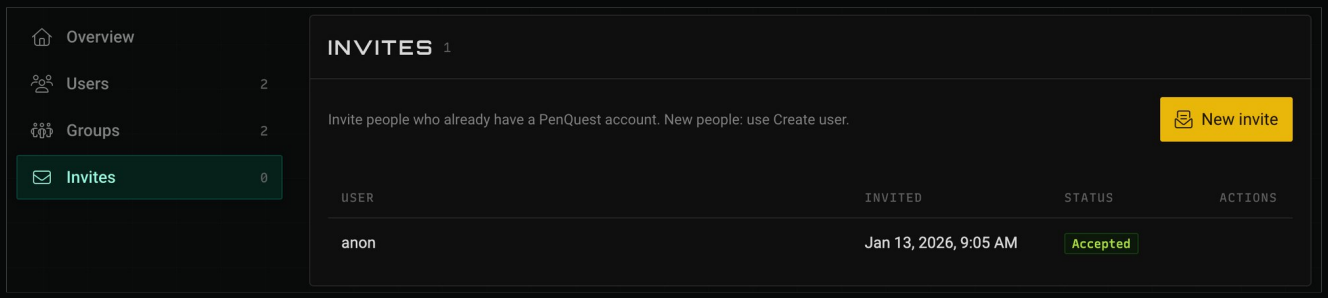


FIGURE 9.4 The invite list.

APPENDIX

APPENDIX

Reference tables and glossary.

A · GAME OPTIONS

These are the rules under **Custom** in the last setup step. Values in teal are the defaults; a scenario can change single defaults.

OPTION	DEFAULT	POSSIBLE VALUES
BOARD AND SETUP		
Initial attack stage	Reconnaissance	Reconnaissance, Initial access, Execution
Defender set-up	Attribute-based	Scenario-based, Attribute-based, Disabled
Defender may rewire	Set by scenario	On, Off
Asset access	Per asset	Per asset, always, never
CARDS		
Initial card selection	Custom selection	Random cards, Playable cards only, Custom selection
Draw actions from the full deck	On	On, Off
Support actions	Drawn normally	No support actions, Drawn normally, Always on hand
Equipment shop	Entire selection	No shop, Random selection, Entire selection
REQUIREMENTS		
No insight requirements	Off	On, Off
No equipment requirements	Off	On, Off
No honeypot limit	Off	On, Off (normally one honeypot per asset)
RESOLVING ACTIONS		
Actions always succeed	Off	On, Off
Multi-target success	Globally (defense only)	Per asset, Globally (defense only), Globally (all actions)
Shields do not deplete	On	On, Off
Availability penalty	Enabled	Enabled, Disabled
Defense action behavior	Unchanged	Unchanged, behave like another type, offer only one type
DETECTION AND VISIBILITY		
Action detection	Use the detection chance	Use the detection chance, Always detect what can be seen, Always detect everything
Detectable defense actions	Response only	Response only, more or all defense types
Users	Always visible	Always visible, Must be discovered

OPTION	DEFAULT	POSSIBLE VALUES
QUIZ		
Quiz	Off	Off, Questions decide success, Right answer raises the chance
Quiz difficulty	Easy	Easy, Medium, Hard
Question type	Action-specific	Action-specific, General, Both

TABLE A.1 All custom rules.

B · GLOSSARY

Action Action

> A card a player plays on their turn. Attack actions belong to a stage, defense actions to a type.

Action Points (AP) Action Points

> The time an action takes, 1 to 5. One turn is worth 3 AP.

Asset Asset

> A system on the board (web server, client, IoT device, …) with Confidentiality, Integrity and Availability.

Attack stage Angriffsphase

> Reconnaissance, Initial access or Execution.

Budget Budget

> Credits for buying equipment. 20 × Resources.

Card set Kartenset

> The pool of actions a game uses: Standard, Fast, Simplified or a scenario's own set.

CIA CIA

> Confidentiality, Integrity, Availability: the three kinds of damage, 0 to 3 points each.

Credits Credits

> In-game money for equipment.

Detection Erkennung

> Noticing an opponent's action. Starts the attacker's turn countdown.

Defense type Abwehrart

> Detection, Prevention or Response.

Equipment Equipment

> Items that some actions require and others are improved by.

Event Event

> A time-limited challenge with its own high score. Joined with an event code or an invitation.

Game code Spielcode

> Six-letter code another player uses to join your game.

Game option Spieloption

> A rule the host can change before the game. A preset sets several options at once.

Insight Insight

> Knowledge about the opponent's infrastructure; some actions need it.

Motivation Motivation

> Actor attribute (formerly Determination). Affects turns and cards.

Organization Organisation

> A closed group of players, for example a course. Managed by its admins.

Prevention Prävention

> Defense type that places shields on assets.

Resources Ressourcen

> Actor attribute (formerly Wealth). Sets the budget.

Scenario Szenario

> The infrastructure, story, roles and goals of a game.

Shield Shield

> Protection on an asset that absorbs damage of matching attacks.

Skill Skill

> Actor attribute. Affects turns, cards and the success bonus.

Support action Support-Action

> Attack-only actions that help other actions (orange cards).

Turns Züge

> How many turns the attacker has (formerly Initiative). Counts down after the first detection.

XP XP

> Experience points, earned in every finished game.

C · TROUBLESHOOTING

PROBLEM	WHAT TO DO
Elements on the board overlap.	Set your display scaling to 100 % or zoom out in the browser.
The game code does not work.	A game code has six letters. Check the code or ask the host for a new one. A game that already has two players cannot be joined.
Joining a game shows an event error.	The game belongs to an event. Join the event first (Events).
The server stopped responding.	Wait about 30 seconds, then reload the page and sign in again. Continue with **Resume** in the main menu.
Your saved game is gone.	The server closes games that were left open for a long time. Start a new game.
You cannot start a new game.	You can have only one open game. Finish or surrender it first.

PROBLEM	WHAT TO DO
You forgot your password.	Use **Forgot password?** on the sign-in page.
A card cannot be played.	Check the Insight requirement, the required equipment, the attack stage of the asset and the asset type. The Prepare Action window shows what is missing.
A quiz answer seems wrong.	Tell the PenQuest team. Most questions were generated by AI.

TABLE A.2 Common problems.