Game Idea Proposal:

Cataclysm Cards

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Games Laboratory

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Introduction and Background Story

Cataclysm Cards is a 2.5D Card Battle Game.

Just like the cliché stories, the continent inhabited by humans is often invaded by monsters from the dark forest, and magicians were the last line of defense for humans in the past. However, the number of magicians is ultimately limited, and as time progressed, equipping armies with standardized magic cards gradually became mainstream. Magicians gradually moved into different professions, such as magic array researchers, energy researchers… Among them, card makers are the officially appointed personnel at the magic research institute specializing in card production. Their job is to continuously research more powerful and effective magic cards to resist the monsters.

Since the discovery and use of magic, experience has taught humans not to use a large amount of different magics in the same area, otherwise, due to the total concentration of all different magic elements reaching the threshold, riots can cause uncontrollable natural magic disasters. Therefore, card makers often have to consider the region of the card and the types of monsters that may appear nearby for individual card design.

You (the player), as a seasoned card maker, accidentally mastered a difficult-to-produce new rune. This rune can utilize the element residual in advance before the total concentration of all different magic elements reaches a set threshold, not only avoiding magic natural disasters but also causing much higher damage than single-element magic. Now you have used this rune to make cards and inserted them into a preset set of cards, and you are now testing in a special venue at a military base on the border of the dark forest. The venue has a special magic array that greatly reduces the concentration threshold, thus minimizing the damage caused by accidental natural detonations during testing. You need to verify the effectiveness of your new cards by fighting with the captured monsters here.

Game Mechanics

Main Goal

- Use magic cards to survive and defeat the monsters.
- Cast normal magic cards to deal small damage and cumulate element residuals.
- Cast trigger magic card to activate element residuals to result in stronger magics before the concentration of element residuals higher than threshold of disasters. Otherwise, the magic disasters will deal damage to both player and monsters.

Chain reaction Theme

In this game, the "chain reaction" theme is embodied through the interaction of elemental residues: when players cast card skills, they leave behind various elemental residues on the battlefield. When specific trigger cards or skills interact with these residues, a chain reaction is set off, with different elemental residues interacting to produce cumulative effects, resulting in greater destructive power or special effects, thereby enhancing both the strategic depth and visual impact of the battles.

Technical Focus

This game's Technical Focus centers on the implementation of real-time chain reactions between various elemental effects, requiring an efficient interaction system for dynamic and cumulative visual effects (VFX). Each elemental residue must interact with others to create unique, layered responses based on the player's card combinations. To achieve this, the game utilizes multi-threading or coroutines to manage simultaneous VFX without impacting performance, especially as multiple chain reactions may occur at once. Additionally, an optimized resource management system is essential for handling the diverse range of high-quality particle effects, lighting, and physics interactions, ensuring smooth gameplay on a variety of hardware configurations.

The game also emphasizes data-driven design for easy modification of card properties and interactions, allowing for scalable and flexible updates as new cards and effects are introduced. We will focus on two things to realize this target:

1. VFX sheet. We will code a sheet to contain all VFX and API to get specific VFX by some parameters.
2. DOTS system. We will use the DOTS system to avoid performance issues when we have too many monsters.

To avoid much calculation when transform the monsters, we will use the RVO2, i.e. ORCA algorithm to do local avoidance, which is usually used in auto robots or games.

Bullseye

2.5D Card Battle Game

Real-time chain reaction with dynamic VFX interaction.

Avoid performance issue
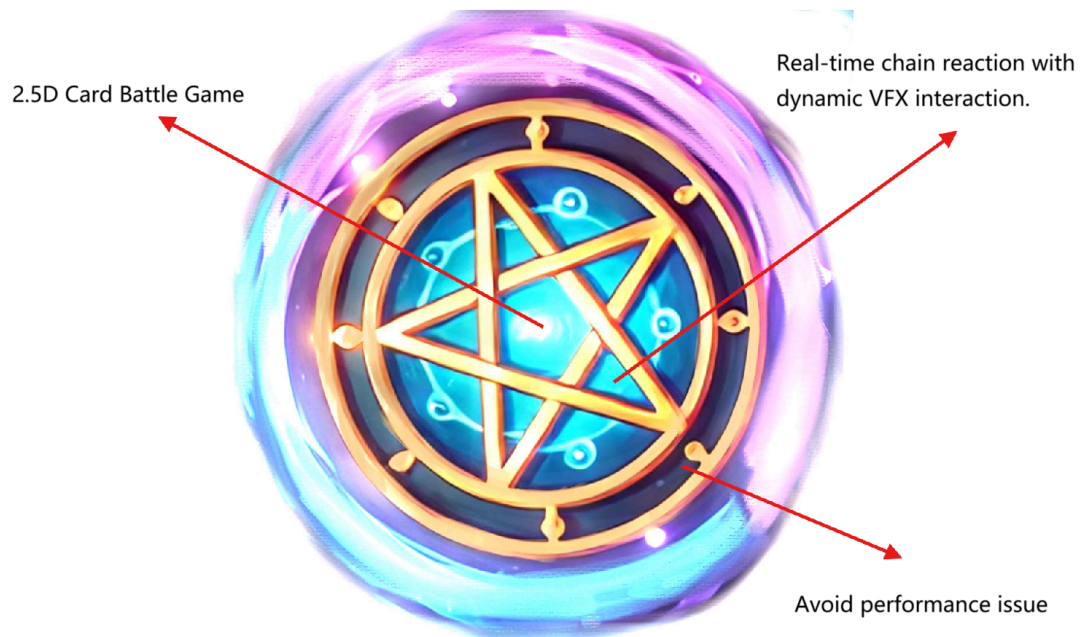
Development Schedule

We tried to construct our layered schedule in such a way that the base game with all its core Game Mechanics will be enough to get playable and polished the game while the layers 3 and 4 will mainly add more animations and visual details.

Timeline Schedule and Tasks List are shown below.

	Deadline	1. Milestone: Game idea	2. Milestone: Prototype	3. Milestone: Interim demo	4. Milestone: Alpha release	5. Milestone: Playtesting	6. Milestone: Final release !!
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6 — Week 13, Week 14 - Only 1 day

#	Name	Tasks
4	ALL	6 + 1 cards totally
5	ALL	10 + 1 cards totally
6	ALL	12 + 1 cards totally
7	ALL	Based on Auto explosion above, create others
8	ALL	Report
9	Andrey	chapter 1
10	Andrey	chapter N
11	Andrey	Background Story Button
12	Andrey	Gameover UI
13	Andrey	Show description of cards
14	Andrey	Description of ppms mechanism
15	Andrey	SFX of magic
16	Andrey	SFX of click UI
17	Andrey	Basic components for Player
18	Andrey	Components for MonsterBoss
19	Andrey	Chapter 1 boss
20	Andrey	Chapter N boss
21	Andrey	chapter 1
22	Andrey	chapter N
23	Cynthia	Map Basic Settings
24	Cynthia	Card Displaying in Bottom
25	Cynthia	PPM
26	Cynthia	Card Cartridge
27	Cynthia	Deck Setting Button
28	Cynthia	Cards display
29	Cynthia	Cards in Deck
30	Cynthia	Level Selection UI
31	Cynthia	Indicator 1 - circle target area on map
32	Cynthia	Indicator 2 - circle under player
33	Cynthia	Indicator 3 - direction from player and any point
34	Cynthia	Attribute design
35	Cynthia	card values
36	Cynthia	player values
37	Cynthia	Unlocked cards
38	Cynthia	Unlocked levels
39	Liu	Solutions to performance issue
40	Liu	Player- rigging deck and creating Animation Controller
41	Liu	Interaction with cards
42	Liu	2 sample cards with VFX
43	Liu	VFX code effect on player/monster/map
44	Liu	Element residual
45	Liu	Explosion of element residual
46	Liu	"Small" VFX for ppm < 30
47	Liu	"big" VFX for ppm >= 30
48	Liu	2 example Auto explosion when ppm >= 100
49	Liu	Game mechanism design
50	Liu	Customized shader
51	Liu	Card cartridge
52	Liu	Player/Monsters/Maps/Animations/VFX
53	Tan	Background
54	Tan	Start Button
55	Tan	Quit Button
56	Tan	Background Music
57	Tan	SFX of monsters
58	Tan	Monster animation usage
59	Tan	Basic components for Monster
60	Tan	components for NormalMonster
61	Tan	Wave setting
62	Tan	monster values
63	Tan	Card Frame Design
64	Tan	Cards Illustration Design
65	TBD	Post processing stack
66	TBD	Deferred rendering

Task	Subtasks	Estimated Time in hours	Time took	Priority	Developer 1	Developer 2	comment
UI							
Maps	Basic Settings			1	Cynthia		
	chapter 1			1	Andrey		
	chapter N			3	Andrey		
Player UI	Card Displaying in Bottom			1	Cynthia		
	PPM			1	Cynthia		
	Card Cartridge			1	Cynthia		Model used from Liu. But show changable MP text. It can be found in player.unitypackage.
Start Menu	Background			3	Tan		
	Start Button			1	Tan		
	Deck Setting Button			2	Cynthia		
	Background Story Button			5	Andrey		
	Quit Button			1	Tan		
Gameover UI	Gameover UI			3	Andrey		
Deck Setting	Cards display			2	Cynthia		
	Cards in Deck			2	Cynthia		
	Show description of cards			2	Andrey		After Tan design the card UI, we will see where to display description.
	Description of ppms mechanism			3	Andrey		
Level Selection UI	Level Selection UI			1	Cynthia		preset a value - isUnlocked
Music							
Background Music	Background Music			2	Tan		
SFX of magic	SFX of magic			4	Andrey		
SFX of click UI	SFX of click UI			3	Andrey		
SFX of monsters	SFX of monsters			2	Tan		
Game Logic							
Solve performance issue	Solutions to performance issue			1	Liu		Need explain to teammates in meeting. Monster/Player do after explanation from Liu.
Animation Controller setting up	Player- rigging deck and creating Animation Controller	15		1	Liu		
Framework of Player and Monster	Basic components for Player			1	Andrey		
	Monster animation usage			1	Tan		
	Basic components for Monster			1	Tan	Liu	
NormalMonster	components for NormalMonster			1	Tan	Liu	Refer from Monster
Boss	Components for MonsterBoss			1	Andrey		Refer from Monster
	Chapter 1 boss			1	Andrey		Refer from MonsterBoss
	Chapter N boss			3	Andrey		Refer from MonsterBoss
Wave setting	Wave setting			2	Tan		
Skill indicator	Indicator 1 - circle target area on map			1	Cynthia		
	Indicator 2 - circle under player			1	Cynthia		Smaller ones are auras, and larger ones are shields etc.
	Indicator 3 - direction from player and any point			1	Cynthia		Fireball start from player. Tornado start from any point in view (Like ultra of Rumble in LOL)
First stage of 2 magic cards + 1 trigger card	Interaction with cards			1	Liu		
	2 sample cards with VFX			1	Liu		
	VFX code effect on player/monster/map			1	Liu	Tan	
	Element residual			1	Liu		
	Explosion of element residual			1	Liu		
	"Small" VFX for ppm < 30			1	Liu		
	"big" VFX for ppm >= 30			1	Liu		
1 example Auto explosion when ppm >= 100	2 example Auto explosion when ppm >= 100			2	Liu		
Based on sample above, create other cards	6 + 1 cards totally			3	ALL		
	10 + 1 cards totally			4	ALL		
	12 + 1 cards totally			5	ALL		
Based on Auto explosion above, create others	Based on Auto explosion above, create others			4	ALL		
Game Designer							
Game mechanism design	Game mechanism design	10		1	Liu		
Game economy design	Attribute design			1	Cynthia		
	card values			2	Cynthia		
	monster values			2	Tan		
	player values			2	Cynthia		
Game boss mechanism design	chapter 1			2	Andrey		It can be done together with Boss in Game logic. Who do chapter N, also design it.
	chapter N			3	Andrey		
Art							
Game art Stylize	Post processing stack			5	TBD		Keep them as TBD now.
	Deferred rendering			5	TBD		illumination etc. Keep them as TBD now.
	Customized shader			5	Liu		
Art of Card	Card Frame Design			1	Tan		
	Cards Illustration Design			3	Tan		
	Card cartridge			1	Liu		
Others							
Game resources/Assets prepare	Player/Monsters/Maps/Animations/VFX	5		1	Liu		Other materials you prepared just count time into the specific task. e.g. music
Saving the current game	Unlocked cards			4	Cynthia		
	Unlocked levels			4	Cynthia		save game states into Serialization Files(Json/XML) or PlayerPrefs, load it.
Report	Report	20		1	ALL	Tan	File report every milestone

Game Art Style

The game features a **cartoon art style** with vibrant colors and exaggerated animations, creating a visually engaging and approachable atmosphere. Characters, spells, and

environments are designed with playful, rounded shapes and expressive details, appealing to a wide audience. Each elemental effect—fire, water, lightning, etc.—is stylized to emphasize clarity and readability in combat, ensuring players can quickly distinguish between different effects during intense chain reactions. The visual effects are crafted to be both dynamic and fun, with a mix of cartoonish particle effects and lighthearted animations that enhance the magical and strategic theme of the game.

Concept Art
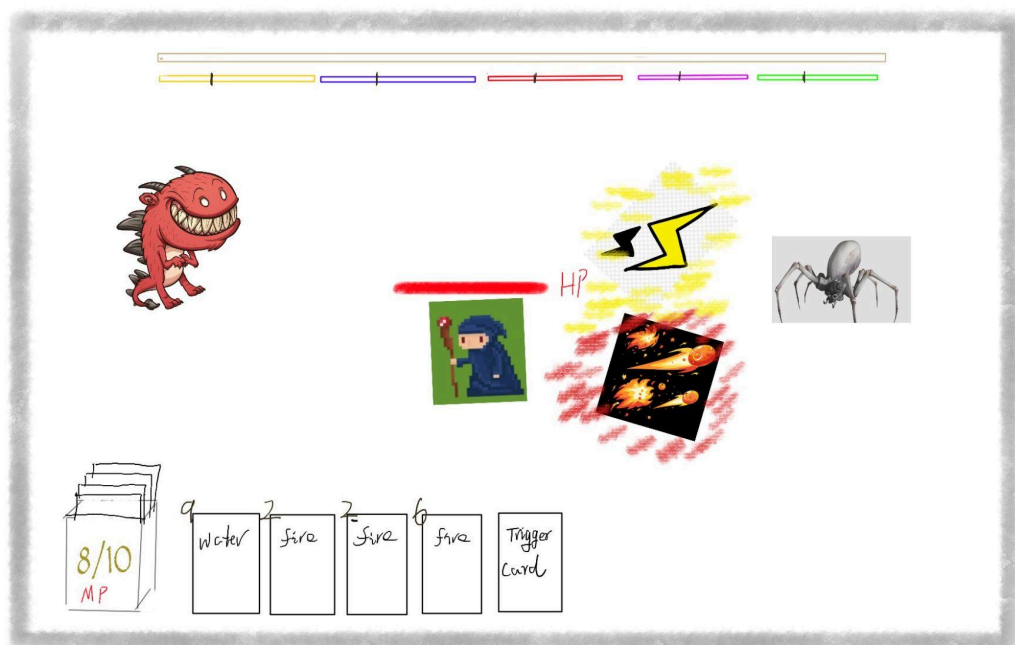
Additional Game Design Details/ Appendix

Player character
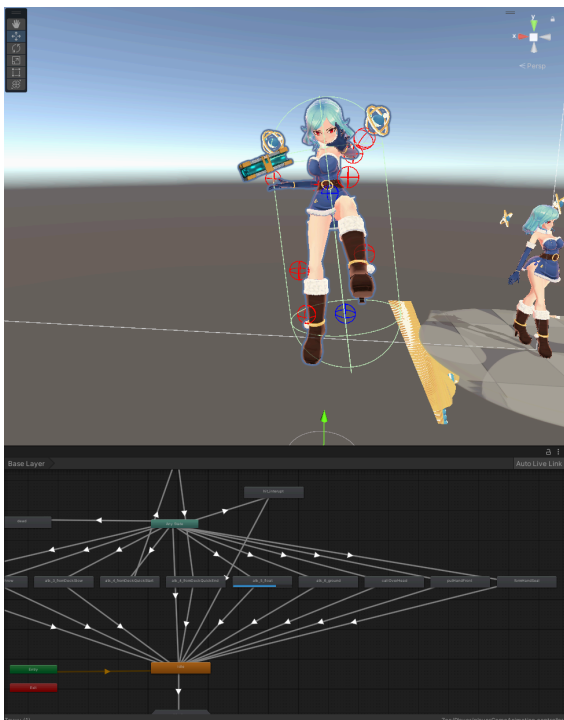
Monster

Game flow

1. Open the game; there are some buttons: Start, Exit, Deck Settings and background story / mechanism introduction (to be done last).
2. Click "Start" to select a level. Each level contains only one type of monster and a final boss.
3. A new level only requires changing the monster model, the number of monsters, and their health points.
4. In the game, normal monsters continuously run toward the player, causing the player to run around the edge of the map like similar games in the market.
5. The player uses magic cards, which usually can only clear nearby monsters.
6. When the player uses a trigger card, it detonates residual elements, causing a larger area of damage, theoretically clearing 99.99% of the monsters.
7. Following the principle of restoring 1 MP per second and auto-explosion at 100 ppm, we can set a new wave to appear every 100 seconds.
8. After 3-4 waves, all normal monsters will be cleared, and the boss appears. The trigger card evolves, allowing the surrounding elements to be absorbed into one spot for an explosion, used to fight the boss.

9. Each level can have a unique boss mechanic, such as a stationary boss that the player avoids bullet patterns for or a moving boss that provides attack warning prompts for dodging.
10. Future addition: At the end of each game, players can go to the Deck Settings to upgrade or unlock cards based on element drops from the current monsters.

Ideas of Magic Effect in Coding Concept

1. Each card contains the following this attributes of `element` - Corresponding element
2. Each elemental residual area information class (`ResidualInfo`) contains the following attributes:
   a. `originCard` - The card originally used for the residual element.
   b. `triggerResidualInfo` - Initially null, records the origin card of the area that triggered the explosion when detonated.
   c. `visualEffect` - Initially null, stored after the effect used is calculated.
   d. `isEnhanced` - A boolean value indicating whether it has been enhanced by arcane magic, which will be explained in later logic.
3. Write a class to record all VFX:
   a. VFX are divided into "small" VFX and "big" VFX.
   b. There exists a function `getBigEffectByXXXX(p1, p2, p3...)` that uses a dictionary, enum, or some if-else logic to find the corresponding "big" VFX based on specific parameters.
4. There exists a function `getSmallEffectByCards(currentCard, previousCard)`:
   a. All effects are written to a dictionary and retrieved based on combinations. The first version includes 10 cards, yielding 100 combinations.
   b. Most of them will be the same in AB and BA sequences, but certain combinations like AB and AC may differ.
   c. When two identical element cards are in `getSmallEffectByCards`, it will lead the `currentCard` to a larger area of VFX.
5. Create a `ChainRecord` class, which includes the following attributes:
   a. `ppm` (e.g., `ppmOfFire`, `ppmOfWind`): Records the ppm concentration of each attribute in the current area. As previously mentioned, 1 magic point increases by 1 ppm.

6. Effect logic calculation and effect release should run in different threads (coroutines in Unity), ensuring fast logic calculation. Multiple coroutines are unnecessary; instead, use a queue to push connected areas to the end of the queue to maintain `ChainRecord` accuracy.

VFX Controller Parameters

1. `n` - Number of times the effect will be cast.

2. `size` - May have 4 different sizes:

   - `Size1_Small = 1` - Original size of effect

   - `Size2_Medium = 2`

   - `Size3_Large = 3`

   - `Size4_ExtraLarge = 4`

To balance visual/emotional feedback and workload, use the following logic upon reaching the current area:

1. After the trigger card is used, display the concentration of each element in the upper of the screen, starting from 0.

2. Current attribute ppm increases by the card's magic point cost.

3. If the current attribute ppm < 30 (value can be adjusted), find effects using `getSmallEffectByCards(residualInfo.originCard, residualInfo.triggerResidualInfo.originCard)`.

4. If the current attribute ppm >= 30, display "X element concentration is over the limit" and produce stronger magic. Use `getBigEffectByXXXX(cardSetsArray, ppmOfElements, originCard)` to determine the appropriate large-area effect ("big" VFX).

   - Some full-screen animations or screen shake may occur in response to high concentrations.
   - A simple animation with a magic circle may be appropriate.

Arcane Area Effect Logic

The effect logic for the arcane area requires separate calculations. Currently, there are two types of arcane:

1. **Arcane Empowerment**: Doubles the effect of the next magic card. If present in `residualRecord`, it produces 5 times the quantity of the original VFX in different directions or doubles the size of the VFX. It only records `isEnhanced` in `residualInfo` without recording the residual area for Arcane Empowerment.

2. **Haste Arcana**: Speeds up the player or accelerates the VFX release if this element is present in `residualRecord`. If the card does not normally move, it initiates movement from 0, and the speed attribute is added to the card's superclass.

Supplement of "Big" VFX

1. The following columns exist in the Excel file: `current elements`, `ppm elements`, and `VFX`.

2. `Current elements` refer to elements in the area that can trigger effects.

3. `ppm elements`: All elements in this column should exceed a threshold. More requirements mean a bigger VFX.

4. If two solutions meet the requirements, compare the ppm element counts. If counts are identical, both will be cast.

   - Hint: The maximum concentration is 100 ppm while big VFX happens when one element is over 30 ppm, so no more than 3 big VFX will be played.

5. If the concentration of Arcane >= 6 ppm, increase the VFX count to 2.

   - Each arcane card costs 2 magic points.

Card and VFX details

Totally, we have 12 cards in design and 100 small VFX between 2 cards and several big VFX when ppm of one element is over 30.

Card Element	Card Name	Magic Point Cost	Card Effect	Enhance each cast
Lighting	Ball Lightning	8	Releases a large, slow-moving orb of electricity that persists for 8 seconds, dealing significant electrical damage and leaving a trail of electrical residue along its path.	8 seconds -> 8 + n - 1 seconds
Lighting	Chain Lightning	4	Deals damage to each target within range, and chains to nearby targets, bouncing up to 3 times.	3 times -> n + 3 -1 times
Lighting	Static Field	3	Generates a 5-second electric field around the caster, paralyzing and immobilizing contacted enemies. The caster's path leaves electrical residuals.	5 seconds -> 5 + n - 1 seconds
Wind	Small Tornado	4	Deals damage and causes a knock-up effect along its 3-seconds fast-moving path. Leaving a trail of wind residue along its path.	3 seconds -> 3 + n - 1 seconds
Wind	Windshield	3	Creates a protective barrier of wind around the caster that blocks enemies and attacks. The shield dissipates once it absorbs damage reaching a threshold.	size = 1.5 ^ n * size
Wind	Gust	1	Knocks back enemies in a conical area (45°) around the player.	1/4 * n pi
Water	Whirlpool	6	Creates a swirling vortex of water at a targeted location, pulling in and damaging enemies caught within.	size = 1.2 ^ n * size
Water	Hydro Blast	4	Unleashes a powerful jet of water that can pierce through multiple enemies in a line, dealing significant water damage.	width = 1.2 ^ n * width
Water	Ice Spike	1	Freezes a large number of sharp ice projectiles from the moisture in the air around the player, continuously firing them in a designated direction for 3 seconds.	3 seconds -> 3 + n - 1 seconds
Fire	Fireball	2	Launches a fireball in a specified direction, leaving behind traces of fire residue along its path.	1 fireball -> n fire ball
Fire	Blazing Trail	5	Leaves a 5-seconds trail of fire behind the caster as they move, damaging enemies who cross it. The caster's path leaves fire residuals.	5 seconds -> 5 + n - 1 seconds
Fire	Flame Burst	7	Triggers a sudden explosion of flames in a small target area, dealing damage to nearby enemies.	size = 1.2 ^ n * size
Earth	Rock Barrier	1	Creates a barrier of 4 small rocks around the caster or at a specified location, used to block enemies or attacks. The caster's path leaves earth residuals.	num of rocks = 4 * n
Earth	Boulder Throw	4	Lifts a large boulder from the ground and hurls it at the target area, causing significant impact damage.	size = 1.2 ^ n * size
Earth	Quicksand	6	Creates an area of quicksand that slows down enemies.	size = 1.5 ^ n * size
Summon	Random Summon	10	Summons a monster with an ability that varies randomly between 0.2 to 2 times the effect of a random card.	[0.3, 3][0.4,4]、[0.5, 5], also change the size of summon monster
Arcane	Arcane Empowerment	2	Doubles one effect of the next card played.	-
Arcane	Spatial Arcana	2	Teleport to the target location.	-
Arcane	Haste Arcana	2	Increases the caster's movement speed for 10 seconds.	-

	card 1	card 2	vfx	
Ball Lightning,Ball Lightning	Ball Lightning	Ball Lightning	Big Ball Lighting	
Ball Lightning,Chain Lightning	Ball Lightning	Chain Lightning	Chain lightning and each point will create a ball lighting without move	
Ball Lightning,Small Tornado	Ball Lightning	Small Tornado	Ball lightning self rotate fast and Nearby monsters are drawn into death.	
Ball Lightning,Windshield	Ball Lightning	Windshield	exploded Lightning half ball like a shield.	
Ball Lightning,Whirlpool	Ball Lightning	Whirlpool	Whirlpool and Ball Lighting, and each one in water pool get Electric dmg	
Ball Lightning,Fireball	Ball Lightning	Fireball	n Ball lightning. n = number of fireball in fireball card	
Ball Lightning,Blazing Trail	Ball Lightning	Blazing Trail	Ball lighting move, and fire on the path	
Ball Lightning,Flame Burst	Ball Lightning	Flame Burst	A area lightning burst	
Ball Lightning,Rock Barrier	Ball Lightning	Rock Barrier	4 small ball lightning rotate in a circle around a area like rock barrier around player.	
Ball Lightning,Boulder Throw	Ball Lightning	Boulder Throw	A big ball lighning throw from sky to the ground.	
Chain Lightning,Ball Lightning	Chain Lightning	Ball Lightning	Same with reverse.	
Chain Lightning,Chain Lightning	Chain Lightning	Chain Lightning	Lighting crazy shoot an area.	
Chain Lightning,Small Tornado	Chain Lightning	Small Tornado	Lightning Tornado	
Chain Lightning,Windshield	Chain Lightning	Windshield	Lightning cube	
Chain Lightning,Whirlpool	Chain Lightning	Whirlpool	Whirlpool and a lightning shoot, and each one in water pool get Electric dmg	
Chain Lightning,Fireball	Chain Lightning	Fireball	n purple fireball	
Chain Lightning,Blazing Trail	Chain Lightning	Blazing Trail	Lightning shooting from sky go through the area of blazing track,	
Chain Lightning,Flame Burst	Chain Lightning	Flame Burst	One area of thick lightning	
Chain Lightning,Rock Barrier	Chain Lightning	Rock Barrier	4 Rock ball rotate, and lightning link them	
Chain Lightning,Boulder Throw	Chain Lightning	Boulder Throw	Lightning ground spikes	
Small Tornado,Ball Lightning	Small Tornado	Ball Lightning	Lightning Tornado	
Small Tornado,Chain Lightning	Small Tornado	Chain Lightning	Lightning Tornado	
Small Tornado,Small Tornado	Small Tornado	Small Tornado	4 Tornados	
Small Tornado,Whirlpool	Small Tornado	Whirlpool	water tornado	
Small Tornado,Fireball	Small Tornado	Fireball	n fire Tornado happen. n = number of fireball in fireball card	
Small Tornado,Blazing Trail	Small Tornado	Blazing Trail	small fire tonado and fire tarack remain	
Small Tornado,Flame Burst	Small Tornado	Flame Burst	very big Fire Tornado happen.	
Small Tornado,Rock Barrier	Small Tornado	Rock Barrier	dust devil	
Small Tornado,Boulder Throw	Small Tornado	Boulder Throw	tonado with some blocks paricle around. Change color in the picture. This one used for with lightning 3 cards.	
Windshield,Ball Lightning	Windshield	Ball Lightning	Same with reverse.	
Windshield,Chain Lightning	Windshield	Chain Lightning	Same with reverse.	
Windshield,Small Tornado	Windshield	Small Tornado	Same with reverse.	
Windshield,Windshield	Windshield	Windshield	a big windshield.	
Windshield,Whirlpool	Windshield	Whirlpool	looks like water shield, but have dmg	
Windshield,Fireball	Windshield	Fireball	fire shield, but have dmg	
Windshield,Blazing Trail	Windshield	Blazing Trail	a fire wall along with track	
Windshield,Flame Burst	Windshield	Flame Burst	fire in a large area as wind shield	