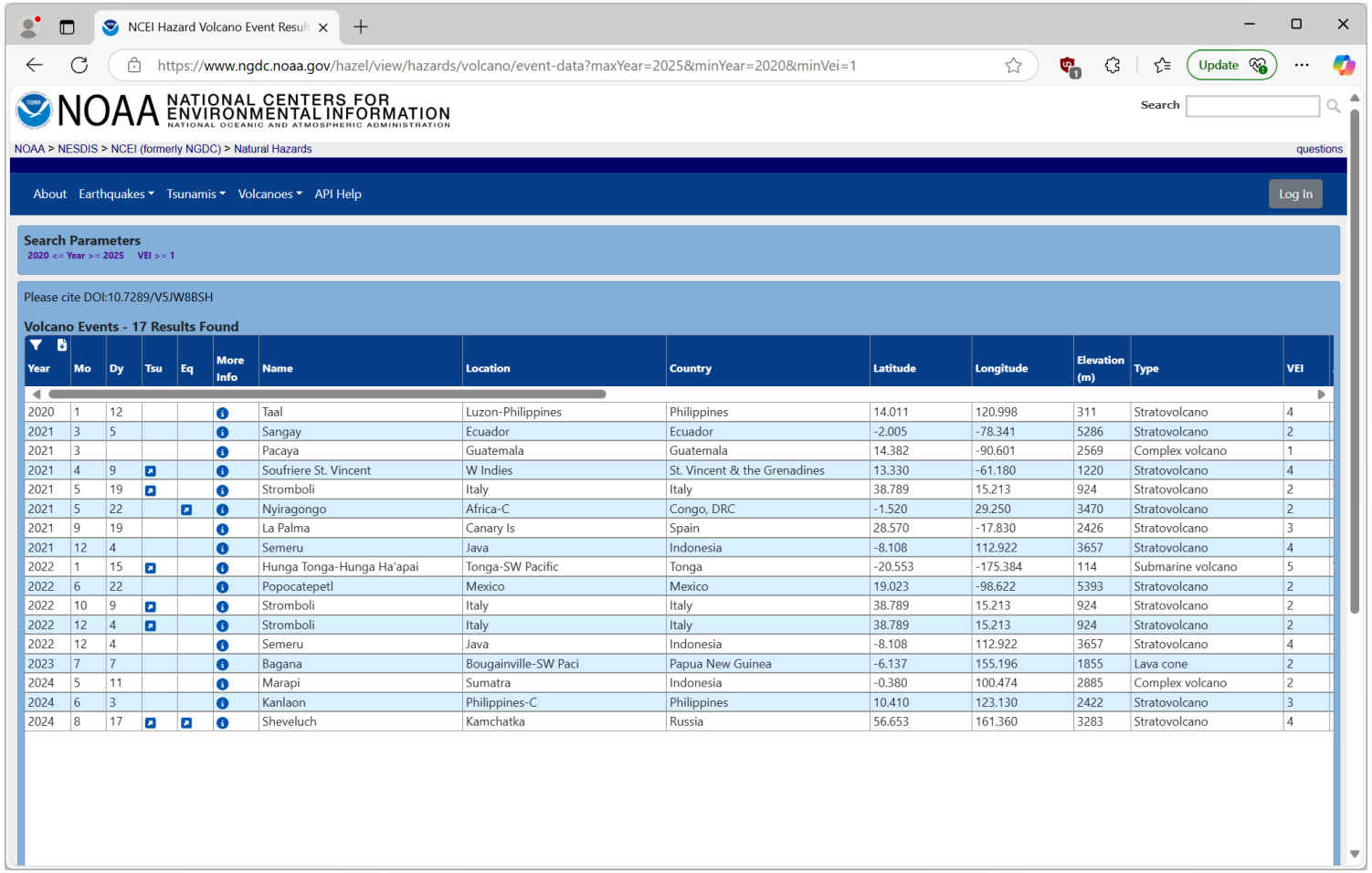
JAVA 프로그래밍 I

514760
2025년 봄학기
5/8/2025
박경신

NOAA Volcanoes

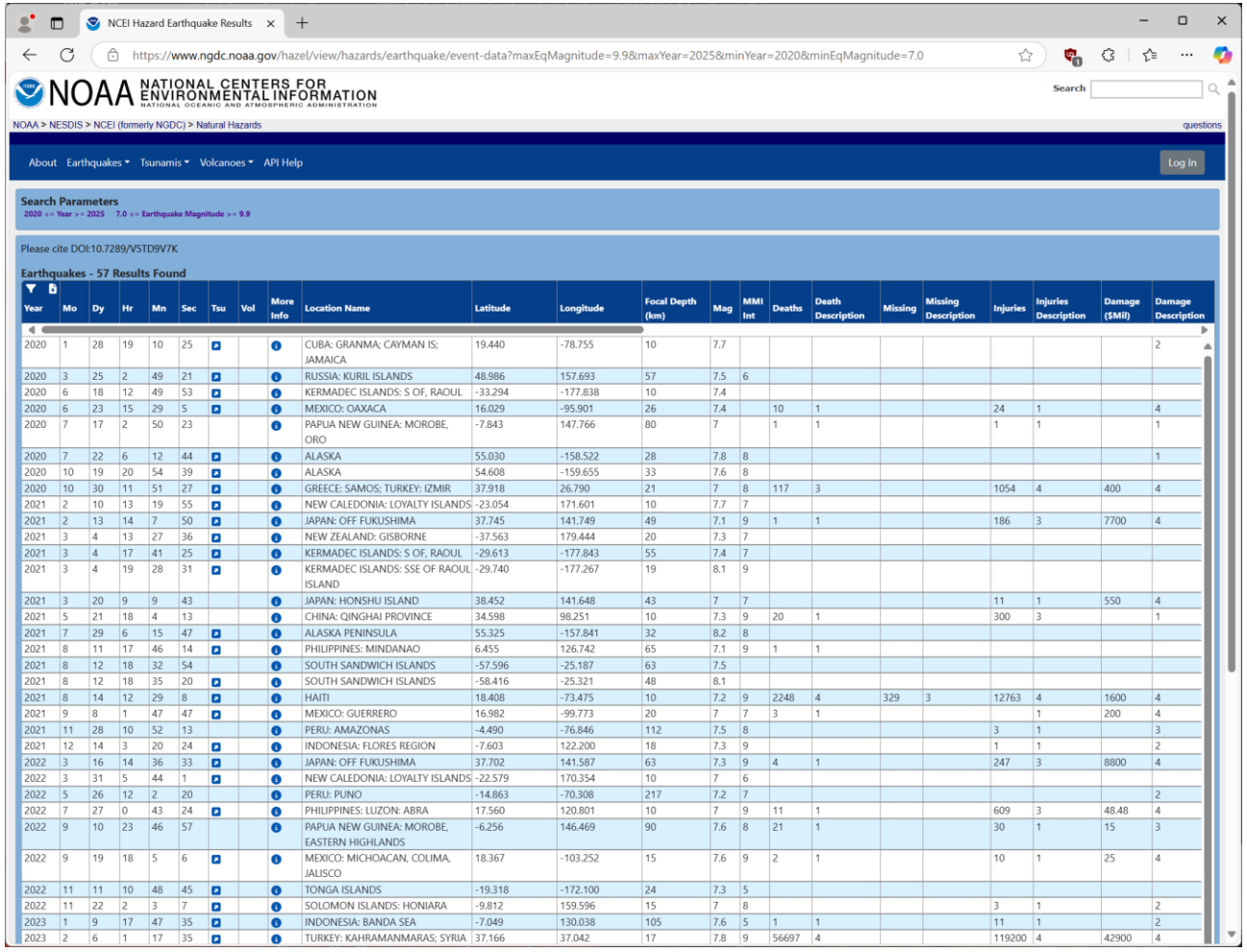
- https://www.ngdc.noaa.gov/hazel/view/hazards/volcano/event-data?maxYear=2025&minYear=2020&minVei=1



Year	Mo	Dy	Tsu	Eq	More Info	Name	Location	Country	Latitude	Longitude	Elevation (m)	Type	VEI
2020	1	12				Taal	Luzon-Philippines	Philippines	14.011	120.998	311	Stratovolcano	4
2021	3	5				Sangay	Ecuador	Ecuador	-2.005	-78.341	5286	Stratovolcano	2
2021	3					Pacaya	Guatemala	Guatemala	14.382	-90.601	2569	Complex volcano	1
2021	4	9				Soufriere St. Vincent	W Indies	St. Vincent & the Grenadines	13.330	-61.180	1220	Stratovolcano	4
2021	5	19				Stromboli	Italy	Italy	38.789	15.213	924	Stratovolcano	2
2021	5	22				Nyiragongo	Africa-C	Congo, DRC	-1.520	29.250	3470	Stratovolcano	2
2021	9	19				La Palma	Canary Is	Spain	28.570	-17.830	2426	Stratovolcano	3
2021	12	4				Semeru	Java	Indonesia	-8.108	112.922	3657	Stratovolcano	4
2022	1	15				Hunga Tonga-Hunga Ha'apai	Tonga-SW Pacific	Tonga	-20.553	-175.384	114	Submarine volcano	5
2022	6	22				Popocatepetl	Mexico	Mexico	19.023	-98.622	5393	Stratovolcano	2
2022	10	9				Stromboli	Italy	Italy	38.789	15.213	924	Stratovolcano	2
2022	12	4				Stromboli	Italy	Italy	38.789	15.213	924	Stratovolcano	2
2022	12	4				Semeru	Java	Indonesia	-8.108	112.922	3657	Stratovolcano	4
2023	7	7				Bagana	Bougainville-SW Paci	Papua New Guinea	-6.137	155.196	1855	Lava cone	2
2024	5	11				Marapi	Sumatra	Indonesia	-0.380	100.474	2885	Complex volcano	2
2024	6	3				Kanlaon	Philippines-C	Philippines	10.410	123.130	2422	Stratovolcano	3
2024	8	17				Sheveluch	Kamchatka	Russia	56.653	161.360	3283	Stratovolcano	4

NOAA Earthquakes

- https://www.ngdc.noaa.gov/hazel/view/hazards/earthquake/event-data?maxEqMagnitude=9.9&maxYear=2025&minYear=2020&minEqMagnitude=7.0



NCEI Hazard Earthquake Results

https://www.ngdc.noaa.gov/hazel/view/hazards/earthquake/event-data?maxEqMagnitude=9.9&maxYear=2025&minYear=2020&minEqMagnitude=7.0

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION

NOAA > NESDIS > NCEI (formerly NGDC) > Natural Hazards

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Search Parameters

2020 <= Year >= 2025 7.0 <= Earthquake Magnitude >= 9.9

Please cite DOI:10.7289/V5TD9V7K

Earthquakes - 57 Results Found

Year	Mo	Dy	Hr	Mn	Sec	Tsu	Vol	More Info	Location Name	Latitude	Longitude	Focal Depth (km)	Mag	MMI Int	Deaths	Death Description	Missing	Missing Description	Injuries	Injuries Description	Damage ($Mil)	Damage Description
2020	1	28	19	10	25				CUBA: GRANMA; CAYMAN IS; JAMAICA	19.440	-78.755	10	7.7									2
2020	3	25	2	49	21				RUSSIA: KURIL ISLANDS	48.986	157.693	57	7.5	6								
2020	6	18	12	49	53				KERMADEC ISLANDS: S OF, RAOUL	-33.294	-177.838	10	7.4									
2020	6	23	15	29	5				MEXICO: OAXACA	16.029	-95.901	26	7.4		10	1			24	1		4
2020	7	17	2	50	23				PAPUA NEW GUINEA: MOROBE, ORO	-7.843	147.766	80	7		1	1			1	1		1
2020	7	22	6	12	44				ALASKA	55.030	-158.522	28	7.8	8								1
2020	10	19	20	54	39				ALASKA	54.608	-159.655	33	7.6	8								
2020	10	30	11	51	27				GREECE: SAMOS; TURKEY: IZMIR	37.918	26.790	21	7	8	117	3			1054	4	400	4
2021	2	10	13	19	55				NEW CALEDONIA: LOYALTY ISLANDS	-23.054	171.601	10	7.7	7								
2021	2	13	14	7	50				JAPAN: OFF FUKUSHIMA	37.745	141.749	49	7.1	9	1	1			186	3	7700	4
2021	3	4	13	27	36				NEW ZEALAND: GISBORNE	-37.563	179.444	20	7.3	7								
2021	3	4	17	41	25				KERMADEC ISLANDS: S OF, RAOUL	-29.613	-177.843	55	7.4	7								
2021	3	4	19	28	31				KERMADEC ISLANDS: SSE OF RAOUL ISLAND	-29.740	-177.267	19	8.1	9								
2021	3	20	9	9	43				JAPAN: HONSHU ISLAND	38.452	141.648	43	7	7					11	1	550	4
2021	5	21	18	4	13				CHINA: QINGHAI PROVINCE	34.598	98.251	10	7.3	9	20	1			300	3		1
2021	7	29	6	15	47				ALASKA PENINSULA	55.325	-157.841	32	8.2	8								
2021	8	11	17	46	14				PHILIPPINES: MINDANAO	6.455	126.742	65	7.1	9	1	1						
2021	8	12	18	32	54				SOUTH SANDWICH ISLANDS	-57.596	-25.187	63	7.5									
2021	8	12	18	35	20				SOUTH SANDWICH ISLANDS	-58.416	-25.321	48	8.1									
2021	8	14	12	29	8				HAITI	18.408	-73.475	10	7.2	9	2248	4	329	3	12763	4	1600	4
2021	9	8	1	47	47				MEXICO: GUERRERO	16.982	-99.773	20	7	7	3	1				1	200	4
2021	11	28	10	52	13				PERU: AMAZONAS	-4.490	-76.846	112	7.5	8					3	1		3
2021	12	14	3	20	24				INDONESIA: FLORES REGION	-7.603	122.200	18	7.3	9					1	1		2
2022	3	16	14	36	33				JAPAN: OFF FUKUSHIMA	37.702	141.587	63	7.3	9	4	1			247	3	8800	4
2022	3	31	5	44	1				NEW CALEDONIA: LOYALTY ISLANDS	-22.579	170.354	10	7	6								
2022	5	26	12	2	20				PERU: PUNO	-14.863	-70.308	217	7.2	7								2
2022	7	27	0	43	24				PHILIPPINES: LUZON: ABRA	17.560	120.801	10	7	9	11	1			609	3	48.48	4
2022	9	10	23	46	57				PAPUA NEW GUINEA: MOROBE, EASTERN HIGHLANDS	-6.256	146.469	90	7.6	8	21	1			30	1	15	3
2022	9	19	18	5	6				MEXICO: MICHOACAN, COLIMA, JALISCO	18.367	-103.252	15	7.6	9	2	1			10	1	25	4
2022	11	11	10	48	45				TONGA ISLANDS	-19.318	-172.100	24	7.3	5								
2022	11	22	2	3	7				SOLOMON ISLANDS: HONIARA	-9.812	159.596	15	7	8					3	1		2
2023	1	9	17	47	35				INDONESIA: BANDA SEA	-7.049	130.038	105	7.6	5	1	1			11	1		2
2023	2	6	1	17	35				TURKEY: KAHRAMANMARAS; SYRIA	37.166	37.042	17	7.8	9	56697	4			119200	4	42900	4

NOAA Volcanoes

```
public static String[][] volcanoData = {
    {"2020", "1", "12", "Taal", "Luzon-Philippines", "Philippines", "14.011", "120.998", "311", "Stratovolcano", "4"},
    {"2021", "3", "5", "Sangay", "Ecuador", "Ecuador", "-2.005", "-78.341", "5286", "Stratovolcano", "2"},
    {"2021", "3", "", "Pacaya", "Guatemala", "Guatemala", "14.382", "-90.601", "2569", "Complex volcano", "1"},
    {"2021", "4", "9", "Soufriere St. Vincent", "W Indies", "St. Vincent & the Grenadines", "13.330", "-61.180", "1220",
"Stratovolcano", "4"},
    {"2021", "5", "19", "Stromboli", "Italy", "Italy", "38.789", "15.213", "924", "Stratovolcano", "2"},
    {"2021", "5", "22", "Nyiragongo", "Africa-C", "Congo, DRC", "-1.520", "29.250", "3470", "Stratovolcano", "2"},
    {"2021", "9", "19", "La Palma", "Canary Is", "Spain", "28.570", "-17.830", "2426", "Stratovolcano", "3"},
    {"2021", "12", "4", "Semeru", "Java", "Indonesia", "-8.108", "112.922", "3657", "Stratovolcano", "4"},
    {"2022", "1", "15", "Hunga Tonga-Hunga Ha'apai", "Tonga-SW Pacific", "Tonga", "-20.553", "-175.384", "114", "Submarine
volcano", "5"},
    {"2022", "6", "22", "Popocatepetl", "Mexico", "Mexico", "19.023", "-98.622", "5393", "Stratovolcano", "2"},
    {"2022", "10", "9", "Stromboli", "Italy", "Italy", "38.789", "15.213", "924", "Stratovolcano", "2"},
    {"2022", "12", "4", "Stromboli", "Italy", "Italy", "38.789", "15.213", "924", "Stratovolcano", "2"},
    {"2022", "12", "4", "Semeru", "Java", "Indonesia", "-8.108", "112.922", "3657", "Stratovolcano", "4"},
    {"2023", "7", "7", "Bagana", "Bougainville-SW Paci", "Papua New Guinea", "-6.137", "155.196", "1855", "Lava cone", "2"},
    {"2024", "5", "11", "Marapi", "Sumatra", "Indonesia", "-0.380", "100.474", "2885", "Complex volcano", "2"},
    {"2024", "6", "3", "Kanlaon", "Philippines-C", "Philippines", "10.410", "123.130", "2422", "Stratovolcano", "3"},
    {"2024", "8", "17", "Sheveluch", "Kamchatka", "Russia", "56.653", "161.360", "3283", "Stratovolcano", "4"}
};
```

NOAA Earthquakes

```
public static String[][] earthquakeData = {
        {"2020", "1", "28", "CUBA: GRANMA; CAYMAN IS; JAMAICA", "19.440", "-78.755", "10", "7.7"},
        {"2020", "3", "25", "RUSSIA: KURIL ISLANDS", "48.986", "157.693", "57", "7.5"},
        {"2020", "6", "18", "KERMADEC ISLANDS: S OF, RAOUL", "-33.294", "-177.838", "10", "7.4"},
        {"2020", "6", "23", "MEXICO: OAXACA", "16.029", "-95.901", "26", "7.4"},
        {"2020", "7", "17", "PAPUA NEW GUINEA: MOROBE, OROA", "-7.843", "147.766", "80", "7"},
        {"2020", "7", "22", "ALASKA", "55.030", "-158.522", "28", "7.8"},
        {"2020", "10", "19", "ALASKA", "54.608", "-159.655", "33", "7.6"},
        {"2020", "10", "30", "GREECE: SAMOS; TURKEY: IZMIR", "37.918", "26.790", "21", "7"},
        {"2021", "2", "10", "NEW CALEDONIA: LOYALTY ISLANDS", "-23.054", "171.601", "10", "7.7"},
        {"2021", "2", "13", "JAPAN: OFF FUKUSHIMA", "37.745", "141.749", "49", "7.1"},
        {"2021", "3", "4", "KERMADEC ISLANDS: S OF, RAOUL", "-29.613", "-177.843", "55", "7.4"},
        {"2021", "3", "4", "KERMADEC ISLANDS: SSE OF RAOUL ISLAND", "-29.740", "-177.267", "19", "8.1"},
        {"2021", "3", "20", "JAPAN: HONSHU ISLAND", "38.452", "141.648", "43", "7"},
        {"2021", "5", "21", "CHINA: QINGHAI PROVINCE", "34.598", "98.251", "10", "7.3"},
        {"2021", "7", "29", "ALASKA PENINSULA", "55.325", "-157.841", "32", "8.2"},
        {"2021", "8", "11", "PHILIPPINES: MINDANAO", "6.455", "126.742", "65", "7.1"},
        {"2021", "8", "12", "SOUTH SANDWICH ISLANDS", "-57.596", "-25.187", "63", "7.5"}, ...
```

과제 Lab4 (Inheritance & Interface)

- Lab3 프로그램을 Inheritance와 Interface를 활용한다.
- **NaturalHazard 추상클래스**
  - int year, month, day
  - String location
  - double latitude, longitude
  - Constructor 구현
  - Getter/Setter 구현
  - toString() 구현

과제 Lab4 (Inheritance & Interface)

- **Volcano extends NaturalHazard**
  - String name, country
  - int elevation
  - String type
  - VolcanicExplosiveIndex vei
  - Constructor 구현
  - Getter/Setter 구현
  - toString() 구현
- **VolcanoParser 클래스**
  - public static Volcano[] parse(String[][] volcanoData)
- **VolcanoSorter 클래스**
  - public static void sort(Volcano[] volcanoes, int index)
    - 0 -> NaturalHazardYearComparator()를 사용한 volcanoes 배열 sort
    - 10 -> VolcanoVeiComparator()를 사용한 volcanoes 배열 sort

과제 Lab4 (Inheritance & Interface)

- **Earthquake extends NaturalHazard**
  - int depth
  - double magnitude
  - Constructor 구현
  - Getter/Setter 구현
  - toString() 구현
- **EarthquakeParser 클래스**
  - public static Earthquake[] parse(String[][] earthquakeData)
- **EarthquakeSorter 클래스**
  - public static void sort(Earthquake[] earthquakes, int index)
    - 0 -> NaturalHazardYearComparator()를 사용한 earthquakes 배열 sort
    - 7 -> EarthquakeMagnitudeComparator()를 사용한 earthquakes 배열 sort

과제 Lab4 (Inheritance & Interface)

- **INaturalHazardFinder 인터페이스**
  - *NaturalHazard[] find(NaturalHazard[] hazards); 추상메소드 선언*
- **NaturalHazardYearFinder implements INaturalHazardFinder**
  - int min, max;
  - *NaturalHazard[] find(NaturalHazard[] hazards)구현 – year 가 min,max 사이면*
- **NaturalHazardElevationFinder implements INaturalHazardFinder**
  - double minLat, maxLat, minLon, maxLon;
  - *NaturalHazard[] find(NaturalHazard[] hazards)구현– lat/lon 값이 min, max 사이면*

과제 Lab4 (Inheritance & Interface)

- **IVolcanoFinder 인터페이스**
  - *Volcano[] find(Volcano[] volcanoes); 추상메소드 선언*
- **VolcanoCountryFinder implements IVolcanoFinder**
  - String country;
  - *Volcano[] find(Volcano[] volcanoes) 구현 – country 가 같으면*
- **VolcanoElevationFinder implements IVolcanoFinder**
  - int min, max;
  - *Volcano[] find(Volcano[] volcanoes) 구현 – elevation 값이 min, max 사이면*
- **VolcanoTypeFinder implements IVolcanoFinder**
  - String type;
  - *Volcano[] find(Volcano[] volcanoes) 구현 – type이 같으면*
- **VolcanoVeiFinder implements IVolcanoFinder**
  - VolcanicExplosivityIndex vei;
  - *Volcano[] find(Volcano[] volcanoes) 구현 – vei가 같으면*

과제 Lab4 (Inheritance & Interface)

- **IEarthquakeFinder 인터페이스**
  - *Earthquake[] find(Earthquake[] earthquakes); 추상메소드 선언*
- **EarthquakeDepthFinder implements IEarthquakeFinder**
  - int min, max;
  - *Earthquake[] find(Earthquake[] earthquakes)구현 – depth 가 min,max 사이면*
- **EarthquakeMagnitudeFinder implements IEarthquakeFinder**
  - double min, max;
  - *Earthquake[] find(Earthquake[] earthquakes)구현 – magnitude가 min, max 사이면*

과제 Lab4 (Inheritance & Interface)

- NaturalHazardYearComparator implements Comparator<NatrualHazard>
- NaturalHazardMonthComparator implements Comparator<NatrualHazard>
- NaturalHazardDayComparator implements Comparator<NatrualHazard>
- NaturalHazardLocationComparator implements Comparator<NatrualHazard>
- NaturalHazardLatitudeComparator implements Comparator<NatrualHazard>
- NaturalHazardLongitudeComparator implements Comparator<NatrualHazard> 구현

과제 Lab4 (Inheritance & Interface)

- VolcanoNameComparator implements Comparator<Volcano>
- VolcanoCountryComparator implements Comparator<Volcano>
- VolcanoElevationComparator implements Comparator<Volcano>
- VolcanoTypeComparator implements Comparator<Volcano>
- VolcanoVeiComparator implements Comparator<Volcano> 구현

- EarthquakeDepthComparator implements Comparator<Earthquake>
- EarthquakeMagnitudeComparator implements Comparator<Earthquake> 구현

과제 제출

- Lab4 메인에서는 VolcanoData와 EarthquakeData를 parse해서 각 객체의 배열로 만든 후, 모든 Finder를 사용한 filtering 테스트와 Sorter를 사용한 배열 정렬 테스트를 수행한다.
- Lab4와 보고서 전체를 묶어서 e-learning에 과제 제출 (due by 5/21)
  - 본인이 원하는 코드 추가 구현 및 테스트
  - 보고서에 전체 코드 분석 및 구현 내용 자세히 설명